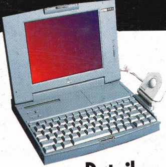
WIN NEC's ULTRALITE VERSA/33C



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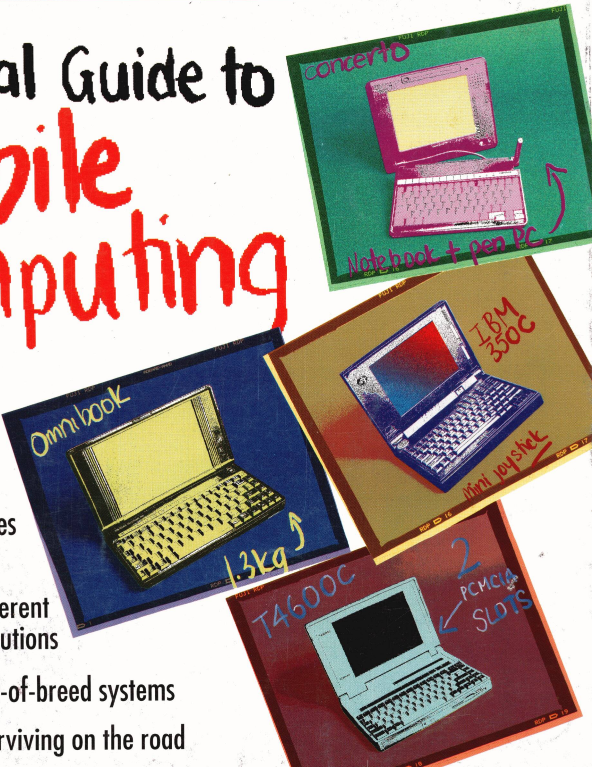
Australian Personal Computer

SPECIAL ISSUE NOVEMBER 1993

Essential Guide to Mobile Computing



Tandy and Newton PDAs

Notebooks Over 40 machines reviewed

Modems 9 different fax and data solutions

PCs 5 best-of-breed systems

ps for surviving on the road

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001·6404
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A938
with APC

mputer you'll still be
ew millennium

Plug-in Screen
- Upgradeable
- Active matrix colour or 64 grey-shade mono
- Reversible to become a pen-compatible tablet
- Easy to replace if repair needed

Memory
- Upgradeable
- Expandable to 20Mb

Removable Hard Drive
- Upgradeable
- 120Mb, 180Mb or 250Mb
- Different users can each have their own drive and still use the same notebook

more
mpletely
time
of NiCads
way from a

Video
- Local Bus (an NEC development)
- Full 1Mb VRAM

Removable Floppy Drive
- Remove after loading/downloading software/data
- Swap for second battery to double the use without recharging

ernational Warranty

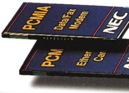
YOUR COMPUTER'S
11TH ANNUAL
PERSONAL
COMPUTER
OF THE YEAR
1
1 9 9 3

Introducing the co
using in the r

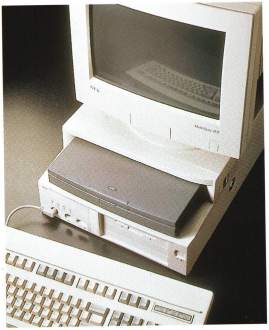
While most of today's notebook computers will be well obsolete by the year 2000, you'll still be using your NEC UltraLite Versa. It's so upgradeable, so flexible and so modular, it will change as technology advances. So the investment you make today will still be bearing dividends in the new decade... century... er, millennium!

CPU
- Upgradeable
- Intel i486SL, 25MHz or 33MHz (a full DX chip unlike 486SLC which is much less powerful)
- 8kb cache & built-in math co-processor
- Power management system for significantly enhanced battery life

PCMCIA Card Slots
- Takes two Type I or II or one Type III cards
- For Faxmodem, LAN, storage, cellular connection and future upgradeability



Docking Station
- Turns your UltraLite Versa into a full 486DX desktop



Removable Battery
- NiMH quick charge type give power without the need to c discharge and recharge eve
- Avoids the 'memory' probler
- Dual battery option if you're power point for long periods

3
YEAR
WARRANTY

1 Year

SPRINT 8019

COMPARE!

You'll find there's only one choice

Independent information technology research company, IRB, tested 6 leading colour notebook computers for speed, versatility, upgradeability and value for money. Their findings showed that the NEC UltraLite Versa was the best buy with an IRB Power Score[1] of 716, way ahead of the nearest competitor. Compare the results of the IRB tests for yourself in the table opposite.

Independent research proves NEC UltraLite Versa ahead on features and value

Model	NEC VERSA 486/33C	Compaq LTE Lite 4/33C	Texas Instruments 4000E DX2/50	AST PowerExec 4/25SL	Toshiba T4600C	IBM ThinkPad 720C
CPU Type	486SL	486SL	486DX	486SL	486SL	486SLC2
CPU Voltage	3.3v	3.3v	5.0v	3.3v	3.3v	3.3v
CPU Speed	33MHz	33MHz	50MHz	25MHz	33MHz	50MHz
Hard Disk	250Mb	209Mb	200Mb	200Mb	200Mb	160Mb
Interchangeable	✓	✗	✗	✓	✗	✓
PCMCIA Cards	Type 1, 2 and 3	✗	✗	Type 1 and 2	Type 1, 2 and 4	Type 1, 2 and 3
Display	Active Matrix	Active Matrix	Active Matrix	Active Matrix	Active Matrix	Active Matrix
Local Bus	✓	✗	✓	✗	✗	✗
Docking Station (option)	✓	✓	✓	✓	✓	✓
Battery Type	NiMH	NiMH	NiCad	NiMH	NiMH	NiMH
Software Bundle	MS DOS 6.0 Windows 3.1	MS DOS 6.0 Windows 3.1	MS DOS 6.0 Windows 3.1	MS DOS 6.0 Windows 3.1	MS DOS 6.0	MS DOS 6.0 OS/2 2.0
Warranty (mths)	36	36	12	12	12	36
Upgrade options						
CPU	✓	✓	✗	✓	✗	✓
Screen	✓	✗	✗	✓	✗	✓
2nd Battery	✓	✗	✗	✗	✗	✗
Pen	✓	✗	✗	✗	✗	✗
RRE inc Tax	$8,874	$9,884	$9,232	$9,336	$9,216	$9,194
IRB Power Score[1]	716	576	566	665	608	708

The IRB PC Mark 93 Score (Power Score) is copyright to International Research Bureau and is a system valuation rating which scales a computer's features to produce an overall product score.

WE'VE BUILT IN VERSATILITY NOT OBSOLESCENCE.

he NEC UltraLite VERSA is so upgradeable allows you to change with technology ithout changing notebooks.

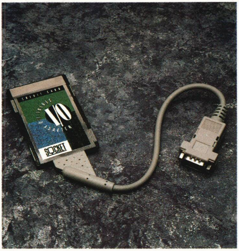
or example, if you start out with a mono creen and feel the need to add a little olour, simply remove it and replace it with a olour one. The user removable hard drive llows you to store private information in a rivate place, or simply upgrade hard drives o suit your change in needs. And for the ser on the move, the floppy drive can be eplaced by a second battery to provide ouble battery life. The advanced Power anagement System conserves operating ower to maximise your battery life even further. The memory is upgradeable as well, from 4Mb — 20Mb. The VERSA also allows you to fit PCMCIA cards, 2 x Type 2 or 1 x Type 3 for landline, cellular, LAN storage and future upgradeability.

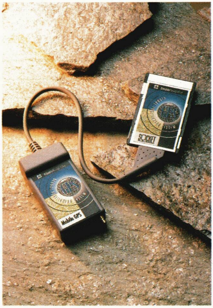
Possibly the best advantage of the UltraLite VERSA versatility, is that you can upgrade it yourself without he help of a technician or a tool box. The only thing you can't upgrade is NEC's amazing 3 year warranty and the international warranty, but that isn't necessary anyway. So contact your nearest NEC dealer for a demonstration or call NEC during business hours (9am-5pm) today on **008 812 796.**

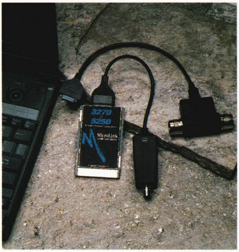
NEC

CROYDON PARK COLLEGE OF TAFE

IF PCMCIA CARDS WERE CREDIT CARDS WE'D BE AUSTRALIA'S LEADING BANK.







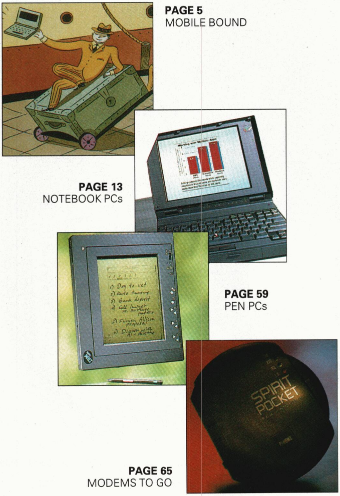
Advanced Portable Technologies (APT) is Australia's leading supplier of portable computing peripherals. And right now, we're scouring the world for more innovative products. We're also rapidly building the country's largest and most sought after range of PCMCIA cards and can supply the products listed below immediately: For further information contact APT. Telephone (02) 975 4466. Facsimile (02) 975 3269.

- ▲ High performance NE2000 compatible Ethernet cards
- ▲ Serial I/O 16550 UART compatible adapters
- ▲ Global Positioning Systems
- ▲ SCSI Controllers
- ▲ IBM 3270 & 5250 emulation cards

ADVANCED PORTABLE TECHNOLOGIES
"The Total Portable Solutions Company"

Essential Guide to Mobile Computing

APC SPECIAL, NOVEMBER 1993
COVER: SAMANTHA KEATS & JOHN DYMOND



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Australian Personal Computer

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5 Mobile bound . . . and surviving

Computing 'wherever, whenever' has fuelled more cynics' column inches than any other technology, but it's coming and it will change not only your work, but your perspective. *APC* looks at survival techniques, ranging from buying a state-of-the-art notebook without burning dollars, basic notebook necessities, travelling in comfort and style both home and abroad, software you should run with, your home setup, and phoning base.

13 Notebook PCs: The art of compromise

Notebooks vary greatly in form, feature and design. But what makes a good commuting companion? How do you differentiate comfort and performance levels from price? In our special review of notebook machines currently on the market, we examine over 40 units, ranging from the PDAs and new supersubnotebooks, to monochrome entry-level notebook PCs for under $3000, through to dream machines costing from $8000 to $15,000 and sporting all the latest bells and whistles.

59 Pens PCs: Computer-phobic's delight

Tired of data entry and transcription? Pen PCs are not yet perfect, but technology is improving rapidly and deserves a good look. Five systems are compared for their ease of use.

65 Modems to go

An Internal modem, or external pocket device, or perhaps a PCMCIA card modem? Portable modems now come in all shapes and sizes and performance range — the trick is matching the right unit to your circumstances. In this feature, we bring together the options for fast, portable fax and data transmission to help you decide which unit best suits your pocket, and put the resulting nine devices through their paces.

PCS 8005 APC

Now "the one that got away" will only be a fish, not an opportunity

When you're away from the office, the amazing PCS Mobile Office will let you be fully productive wherever you are.

The Mobile Office is built around the award-winning NEC UltraLite Versa notebook computer with cellular interface, built-in fax and data modem, and windows-based fax and OCR software; the P3 mobile cellular phone; and battery-backed portable printer — all carried in a choice of cases.

All the components are battery powered, so you don't have to go near a power point to be completely in touch at all times. You can send and receive faxes or access your desktop or mainframe computer.

If business depends on you, the PCS Mobile Office will let you be away without worrying about what's going on back at the office. That's good news, but not as good as the price, because you can own a Mobile Office for as little as $9,995 including tax.

For more information call PCS Australia on:

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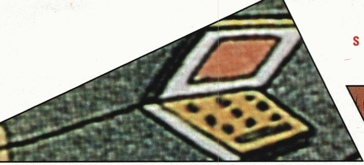
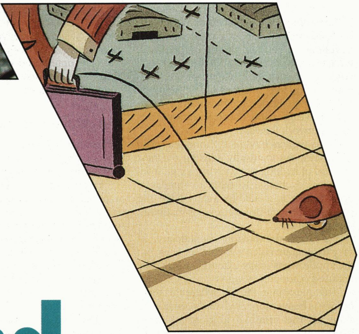
PCS
AUSTRALIA

PCS Australia, 134 William Street, Sydney Phone: 008 066 466 Fax: (02) 368 4888





Mobile Bound

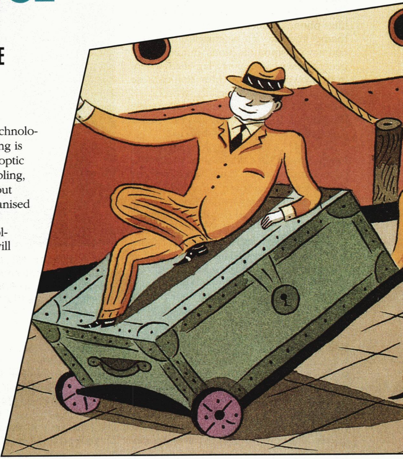
BY JEREMY WHITE

Somewhere tangled in a morass of alliances, competing technologies and regulatory bacteria cultures, ubiquitous computing is lying befuddled. It's an intricate morass, with loose fibre-optic cable-ends, unassigned radio bandwidth, twisted UTP cabling, and one or two slightly lost satellites for good measure, but looking at it, you can see that with time and cash it can be organised into a neat rack-mount and patch panel.

Computing 'wherever whenever' has fuelled more cynics' column inches than any other technology, but it's coming and it will change not only your work, but your perspective.

The dream is that by the time we've cleaned up after the Olympics, the combination of wireless communications and mobile computing will be redefining our working lives. High speed radio and microwave communications infrastructure will be in place, Personal Communications Services (PCS) will ensure we can be tracked down wherever we are, and Personal Digital Assistants (PDAs) and superportable notebooks will let us play MultiUser Solitaire wherever we wish with opponents across the globe.

Less than two to three per cent of the traffic generated by the 12 million cellular network users in the US is currently data. It is a network designed for voice. It's demonstrated, though, that communications on the run are not only feasible, but in most ways desirable.



Wireless data communications will be driven initially by PCS, which is already being trialled. PCS will let you have a cordless phone at home, a car-phone when travelling, and a fixed phone in the office, with a single phone number and back-end voice mail system. Cellular phones become, if you like, a subset of PCS services. The voice quality should be superior, however, and reasonable data transfer over this same network feasible.

So as well as having a phone that goes anywhere, automatically sensing the best method of making or receiving a call, from the local exchange to radio to satellite if nought else is available, you'll have the potential for data-driven devices that work the same way.

PDAs are the obvious beneficiary, as they'll integrate voice and data services, but the applications easily extend to more fully featured computer systems.

The question in the US, where this technology is being pioneered, has been how to slice up the minimal amount of radio bandwidth available for use by the hordes of companies and alliances looking for action.

The US Federal Communications Commission has announced that it is auctioning off — for an expected $US10 billion — a reasonable chunk of bandwidth currently held by emergency services and other specialist groups, who have a set timeframe to move out.

With the wrangles here over digital cellular phones, which can't even carry data feeds, and the mess surrounding this country's communications infrastructure generally, we can expect a lag of anywhere from two years over the provision of these services in the US — hopefully. What bodes well is that there are so many dollar signs flickering in so many eyes, and that PCS is a globally-based service in any case.

In the US, many are looking for action, hunting in small and not-so-small packs. The telecommunications giant AT&T, for example, sees PCS as a way of breaking back into the local delivery market from which it was barred by Federal Regulators, with the formation of the Baby Bell companies following anti-trust complaints from MCI. It has bought out McGaw Cellular to place itself in a position to utilise and develop the technology required. MCI has taken a different approach, forming a Consortium with roughly 200 smaller companies to develop services and delivery mechanisms.

Other companies like Motorola, with its Newstream and EMBARC, already have wireless data services. Currently, these are pager-based, and used for receiving set patterns of information. This technology will quickly expand to include, in essence, two-way paging, and in turn the ability to use pager-like technology to check stock quotes and news stories, but also answer your emails, usually in conjunction with a small handheld device like HP's 100XL.

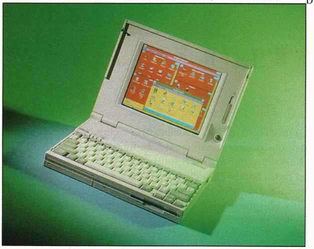
Whereas once product drove companies, it is now delivery. Wireless communications services promise to finally delivery untethered computing, and they will revolutionise the entire telecommunications system.

Survival techniques

Of course, as always with anything half decent, this is all year's away, and I want ubiquitous computing now.

You can spend a lot of money, and build a portable office with wireless paging for receiving emails, and hook up a cellular data modem for on-the-run communications, and you can even buy your own personal mobile satellite dish from Telecom to phone from anywhere. You're contemplating a Visa bill of something around $10,000 for cellular, and treble that or more for satellite, however. It isn't cost effective.

Therefore, overcoming the limitations of current mobile technology requires forethought and compromise. The benefits of being able to work where you need or want are sufficient to make some expense and inconvenience worthwhile, although how much of each you're prepared to tolerate will determine just how mobile you can become.



With an screen width of 8.4in (21.3cm), in Compaq's LTE Lite 4/33C is the current norm. If a wide, readable screen is more important to you, whether in colour or monochrome, check out something like the IBM ThinkPad 720C's 10.4in display

Receiving your emails over breakfast on the yacht wirelessly with your PDA will be just wonderful when it arrives, but it ain't here yet. Buy yourself a good notebook, a modem, and some phone cabling instead.

The appropriate hardware/software combination you should choose depends on your profession and expectations. Only one notebook computer, for example, is really appropriate for those who need to manage a normal workload on the fly — the superportable HP OmniBook — and for many it will still have too many compromises. On-the-run technologies, including wireless LANs and instant-on Windows PCs are still rare and expensive. Mobile technologies are improving rapidly, but perfection hasn't reached the drafting table.

For this Guide, we've concentrated on mainstream technology, and as a result it has a bias towards people working from different desks in different places, rather than those using satellite dishes to video conference while parked atop a pile of rubble at the pit of a freshly blasted open-cut mine.

Radical portability

Pundits have been designing theoretical portable offices since the first PCJr was dropped on the back seat of a Holden. Most include variations on the theme of cellular/radio/satellite modems, fax modems, pagers, beepers, fold up colour inkjet A3 printers, cellular phones and programmable toenail cutters, usually bundled in a large steel briefcase or designer shoulder carry bag with a $10,000+ notebook PC and a Telecom issue toolbox for breaking into Holiday-Inn phone systems.

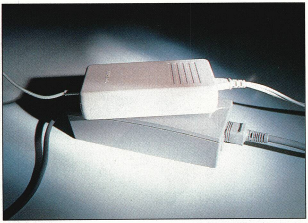
Unfortunately, you are going to need to burn dollars to establish a feasible portable workset — the bulk of the investment will be in a good notebook. The technology is already here to establish wireless LANs and cellular email connections if you wish, but how far along the cost-benefit comparison chart you choose to go before you stop buying and start working is up to you.

The notebook is the core of your work environment — for most of us, it is the portable office.

The criteria and priorities on which you should base a purchase vary depending on whether weight, battery life, or performance are most important to you. We analyse notebook features in detail in our comparative reviews, but it's important to distinguish comfort features from necessity.

Keyboard and pointer are not 'comfort' features — it's a necessity that these are comfortable and easy to use. Your PC should be Windows capable. With notebook RAM ludicrously expensive, 4M will suffice, although avoid less than 120M of hard drive space. Your PC should be based preferably on either the Intel 486SL/25 and 486SL/33 low-power-consumption processors.

Although most notebook batteries have around two hours of raw battery life, look for Microsoft Advanced Power Management compliance, with featuress including individual component spin-down, suspend mode and hibernation — where RAM contents are dumped to disk for recall. These typically extend real use beyond four hours. Models like the NEC Versa that allow you to swap a floppy drive for a second battery are a boon.



AC adaptors have been accepted as bulky add-ons since the dawn of the portable age. But since Toshiba came out with its tiny two-prong last year, power bricks the size of the one shipped with the NEC UltraLite Versa/25C really have no excuse

Buy at least two battery packs, and an external charger/discharger. Avoid NiCad batteries; they have shortish lifespans, and suffer from battery 'memory', a phenomenon where unless the battery is fully discharged between charges, it will in effect treat the point of drain at which you recharged as 'empty' from there on in. Nickel Metal Hydride batteries are more robust, and are happy to be plugged into mains supply without fully draining the battery. They generally last longer — both for individual charges and in lifetime — but are more expensive.

In many cases, the best notebook features are expensive beyond the benefits they offer. Active matrix colour, for example, adds roughly $3000 to the cost of a notebook. If your job is giving presentations, or you need to work with colour for design work, the expense is worthwhile. If you're working in a spreadsheet, and use colour to differentiate categories of information, then the cost may be justifiable. If you're writing reports, answering emails, and managing your schedule, you can probably evolve without. If you need colour, conscientiously consider dual-scan passive matrix colour — it is very good, and demands half the premium. An internal modem bay is not a necessity, as in most cases high-speed internal modems are vendor specific and it's not worthwhile for notebook vendors to undergoe the rigmorole and expense of Austel approval. The most popular brands are, with exceptions, exceptions. Compaq's new SpeedPAQ modem is a gem, and there is even an OsiTech dual faxmodem/network card available.

A modem is a necessity though. PCMCIA credit-card size devices offer the best alternative to either an external modem, or internal bay, although they remain more expensive for equivalent specifications. Banksia has a 14.4K credit card fax modem with Austel approval already (although not sent to us in time to be reviewed in this Guide), and other companies will follow. The next best choice is an external pocket modem. This adds weight, and occupies a serial port, but for units without PCMCIA, or for an easily shared option, a unit like NetComm's Pocket Rocket E7F is light, has a small footprint and rechargeable battery power.

Do not buy less than a V.32 modem unless you really can't stretch the budget, and if possible choose a fax modem. For very little extra cost, the ability to send or receive a fax anywhere with a phone jack is critical.

Travelling in comfort and style

Carry bags are available in an array of forms and styles, and obviously the aesthetics are a matter of preference. Several companies, including Targus and Solidex, specialise in notebook carry-bags, and most of the notebook vendors offer decent if limited options.

Beyond ephemery, the features to consider include the amount of padding, the rigidity of the case, and the number of pockets. Leather is expensive, but it is durable and comfortable to carry. Nylon cases have a tendency to tear with weight and over time around corners and joinery. Metal cases are like Bronwyn Bishop, shiny, cold and tough as nails, but they do lack that soft warm feel.

The nature of travel is that baggage is bumped, jostled, and ape-handled. It's commonsense to ensure that no set of circumstances can damage an investment of $5000 or more. Check in particular the security of the clasps on shoulder straps; many are weak or work loose easily.

Models range from slim-line A4+ dimensioned bags with a few expandable pockets for additionals, such as those sold with NEC's Versa or Sharp's PC-7750, to reinforced A3-sized carry cases large enough to hold two notebooks and additionals, with separate container areas for papers, accessories, and power supplies. These can add enough weight though to break your desire for mobile power. Don't worry unnecessarily about 'organiser' features, either. The imperatives are maximum carriage capacity and protection.

My favourite approach is Compaq's; you get both a large reinforced carry case, with adequate compartments and pockets, but then the notebook itself is contained in a small handheld carry case within the main compartment, which in turn can be removed and used on shorter journeys without accesssories.

The combination of a small handheld case like this with a traditional travel bag, such as a PakLite, is also appealing. You can fit a notebook (in slimline case) and other accessories in one pocket, but still fit jumpers, books and papers in the surrounding expanding pockets. Anything that cuts down the number of bags you need to carry is a bonus, especially when flying. I've even carried three notebooks this way in the one carry bag. Despite the quip about carrying a Telecom toolbox, a small utility kit proves useful. The danger with carrying one is that your carry bag will spew out chunky grey spaghetti everytime you open it as your various parallel, serial, power, and phone cables, and an assortment of gender benders, null modem connecetors, screwdrivers, plyers and plug converters fall about.

Carry as little as possible:

- A serial cable with dual male and female connectors, or dual 9-pin and 25-pin connectors, a null modem adaptor, and a 9-pin to 25-pin convertor. This should cover all potential connections to other PCs, modems, and a fair number of printers. Parallel is quicker for PC-to-PC transfers, and is necessary if you need to print to a printer with a Centronics-style interface.
- Between four and five metres of UTP cabling (with RJ-11 jacks either end), and an RJ-11 to Australian three-pronged phone plug convertor. The length will be welcome in hotel rooms where the phone jack is beside the bed on the other side of the room from the desk. RJ-11 is the world-standard phone plug, and is common even in hotels and office blocks in Australia.
- If travelling to far-away places that you don't expect to cater for modems, or your accommodation does not have data-ports on its phones or accessible wall jacks, phone cabling with alligator clips at one end is a clean method of

connecting — remove the wall jack cover plate or handset cover. The alternative is an acoustic coupler.

- Carry a small multi-head screwdriver and good pen knife.
- Take a spare battery pack and charger only if you know you'll need the battery life. The converse — forgeting your AC adaptor and power cables if you're going somewhere without a power supply for an afternoon — doesn't necessarily apply. A notebook without juice is just an expensive brick.

Travelling overseas

If travelling overseas, there are five different forms of power plugs to consider — Australia is the only country to use our particular three-prong affair. Our advice is forget the worry of convertors. Notebook AC adaptors should auto-switch between the different voltages and Hz, and all use standard D-type connectors for their power cables. Therefore, the least complicated solution is to buy a standard local power cord when you arrive — if not before you leave. In emergencies, there'll often be one on the hotel kettle or iron, and there's a reasonable chance hotel staff will have cords to spare.

External modem power supplies are only marginally more complex. If you're staying for a while in the one country, hunt out an adaptor plug, otherwise buy yourself the appropriate transformer locally. If you're moving quickly between countries with different standards, stick to 9V batteries.

Tips and tricks for jetsetters

Pack an information card with contact details, including an itinery if travelling, with your carry bag. Also include these contact details in your AUTOEXEC.BAT, so they appear during the boot process.

Ensure you keep floppy backups of your most valuable documents, and carry three DOS boot or recovery disks.

Never leave your notebook far beyond your grasp while travelling. The luggage holds on international flights are not only known as black holes because they're dark! And while most hotels offer security boxes and luggage minding, few of the first are large enough to hold a notebook, and few of the second will care for anything of value.

Hotel security policies are generally designed for jewellry and passports, not high technology. It's worth hassling staff to impress that you need somewhere safe to leave your notebook, and complaining if not. A constant stream of requests led to hotels providing phone jacks for data access and business centres, and it only takes a change of policy by one or two chains and the others will follow rather than lose customers.

If you travel by airline, join Golden Wing or Flight Deck, each of which cost around $200 per year. As well as Frequent Flyer Points and free food and drink, membership gives you a good work environment, with access to power outlets and phone jacks. Ansett also distributes its full flight and pricing schedules on disk in Windows and DOS versions.

Airlines worldwide restrict the use of portable electronic devices during take-off and landing, reducing your onboard work-time by half an hour or more. Configure your notebook in the flight lounge before boarding with the documents and applications you'll use, and then place your unit in suspend or hibernation until after take-off.

Airport X-rays should do no harm to your computer gear. The only potential danger is from low levels of residual magnetism, but the chances of damage are low. In Australia, not allowing your notebook carry bag to pass through the X-ray will result in a manual bag search, where you'll be required to power on the notebook, so travel with batteries charged, or at least with the AC adaptor readily accessible.

Overseas, security levels vary. In the US, you can expect to demonstrate your notebook working — whether it's been through the X-ray or not — at most of the larger airports. It won't happen 100 per cent of the time, but it is likely.

Software on the run

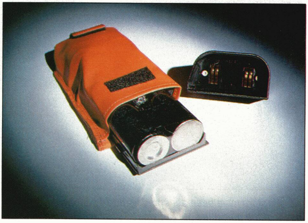
It was until recently necessary to load and use different aapplication sets on your notebook and desktop PCs. Even a year ago, Windows was barely feasible on a reasonably priced model, with most featuring 1 or 2M of RAM, 386 processors and less than 60M of hard drive.

The bulk of notebooks are now Windows-happy, with 4/120 the standard configuration. For preparing this feature, for example, we experimented with a Sharp PC-7700 486SX/25 with roughly these specifications.

There are some applications suited to mobility, though. Norton Commander 4.0 is a must-have. It provides fast DOS file management, including hot copying in and out of compressed archives, file viewers for the bulk of popular applications, a well endowed terminal emulator, and easy serial or parallel file transfers between two PCs.

Hard drive space is still limited on notebooks compared to desktops, so DOS 6.0 DoublSpace, Stac, or Stacker 3.1 are worthwhile. The inate fragility inspired by jostling even the most robust notebook, and the inclination of Murphy's Law to strike when your 25,000 feet from the nearest DOS recovery disk, make installing PC Tools or Norton Utilities wise.

As it quickly becomes your main machine, even a 250M hard drive will fill quickly, especially if you're loading full installs of mainstream Windows applications. The latest version of WordPerfect for Windows, for example, requires over 30M of drive space. Installing core application components only can cut drive requirements by two thirds or more.



Tired of juggling your productivity with your portable battery life? Texas Inustruments' battery charger/discharger allows you to work with one battery while charging up a new one. It even allows a full discharge to condition your battery and avoid problems with battery 'memory'

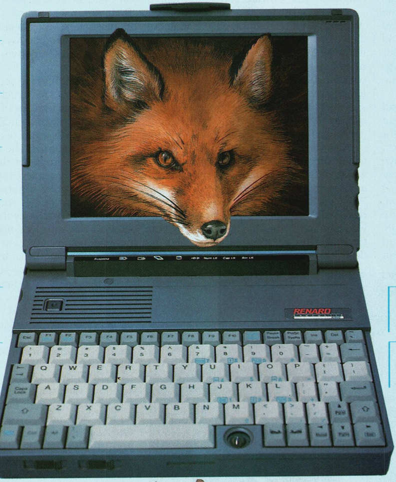
'Lite' programs combine low specification requirements with feature sets suited to transient computing. Q&A Write, for example, mimics the interface and features of MS-Word, without all the drawing, charting, grammar checking and macro language overheads. It allows you to work on Word and other document formats natively, making changes but saving back in the document's original format.

Home base

If you work mainly in one or two places, use the money you save by buying a monochrome system instead of active matrix colour to purchase one or two external SuperVGA monitors. While a good greyscsale screen is adequate, Windows requires a reasonable colour display, and the cost of a low-end monitor improves the computing experience substantially.

Switching video modes under Windows is clumsy, and most of the time you'll remain at the same VGA resolution sup-

Less is more. The Renard B400S Sub Notebook.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X400 FLEXIBLE NOTEBOOK
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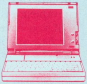

P400D POWER NOTEBOOK
33MHz,
486, DX2,
Mono/Colour

B400S SUB NOTEBOOK
33MHz,
486, Ultralight

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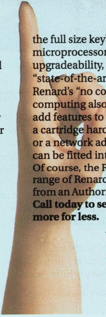

How can something so small, so compact and light be as powerful as notebook computers much larger and heavier? Easy, when it's the ultralight Renard B400S Sub Notebook.

Weighing in at a tiny 1.7 kilograms and just B5 in size (that's smaller than this ad!), the Renard B400S still gives you the sort of outstanding 486 processing power you need to tackle the most demanding tasks - whether in your office, or on the move.

The Renard B400S has taken notebook computer technology to a new level. Its extraordinary number of advanced features, together with its standard features, is unprecedented in portable computing. From the high power, long life Nickel Metal Hydride battery and brilliant screen technology through to the full size keyboard, in-built trackball and flexible microprocessor, RAM, hard disk, and screen upgradeability, the Renard B400S is truly far in advance of "state-of-the-art".

Renard's "no compromise" approach to portable computing also means total flexibility in the ability to add features to suit your individual needs. For example, a cartridge hard disk, or a modem/fax for communication, or a network adapter for connectivity to other computers can be fitted internally.

Of course, the Renard B400S, along with the rest of the range of Renard Portable Computers, is only available from an Authorized Renard Reseller.

Call today to see how the Renard B400S can give you more for less.

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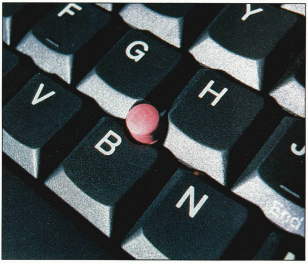
ported by your notebook's display, so a 14in display is sufficient, with the option of higher resolution when it's needed.

A good 101-key external keyboard, and desktop mouse combined with reasonable monitor will leave you wondering why you ever needed a full desktop PC.

Port replicators save the minimal hassle of hooking up mouse, VGA and keyboards separately each time, but are possibly not worth the cost. Desktop expansion units are more useful, usually providing three ISA expansion slots, spare drive bays, and network connections. However, they add from $1000 to $1500 to the cost of your system. They offer the easiest connection to an office LAN and good peripherals, but the convenience is at a cost.

If you have PCMCIA slots, the second purchase you should make after a modem card is a network card. The alternative for PCs without is an external Ethernet adaptor, plugged into the parallel port. If you move between several sites, each with different network topology and hardware, an external adaptor like Xircom's is the better option, despite slower performance than the company's PCMCIA card, as you can easily switch between 10BaseT, thin Ethernet, and Token Ring networks by attaching a different adaptor. External models are also easy to pool between groups of users.



IBM has come very close to providing the perfect internal trackball with its keyboard-situated TrackPoint II

With moderate expenditure, you can set up a near-perfect system. We use a Sharp PC-7700 notebook, a Xircom Pocket Ethernet adaptor, a Logitech serial mouse and NEC 4FG monitor to create an ideal work environment. No fussing around with serial or file transfer cables or programs is needed; you simply plug in your screen and network adaptor, and you are live on the network with full services.

PCMCIA has taken time to gain acceptance, but promises to remove most of the remaining need for full desktop expansion units. Companies like Advanced Portable Technologies now offer everything from a single serial port to a full SCSI port on a PCMCIA card. You can also buy SRAM and Flash Memory cards, and PCMCIA Type III 40M hard disks on a credit card. Even 5250/3270 Microlink adaptors and Global Positioning Systems are available in this format.

Slower but cheaper alternatives for connecting SCSI devices exist. The BackPack CD-ROM, for example, piggybacks on your system's parallel port, although it does not meet the MultiMedia Council's MPC Level 1 transfer rate specification of 150K/sec. SCSI Corp's MiniSCSIPlus allows you to use your parallel port to connect any SCSI device, with similar performance degradation.

Phoning home

Remotely accessing your office can become a complex process, but can be divided into three types of access: full network services, remote control software, and remote email.

Email is by far the least resource demanding and the simplest to operate. As it relies on a store and forward architecture, it is also the most cost effective, requiring minimum time online possible. Using a package such as cc:Mail Remote, or MS Mail Remote, you prepare and read your messages off-line, logging onto the mail server only to send your replies and receive new items in a batch download.

New versions of cc:Mail Mobile allow you to log onto the mail router in real-time to access old items, and also choose which of any waiting items you wish to download. While useful for anyone, this architecture is designed particularly with expensive wireless communications in mind, allowing you to choose just the most important items to download, and avoid large or unnecessary transfers. Both Microsoft and Lotus are also working with large communications companies such as AT&T and MCI to allow remote mail users to dial into these service's local email hubs rather than initiate long-distance phone calls back to their office to receive mail, and to use the same front-end and storage system for mail from both commercial service accounts and LAN-based mail accounts.

Remote control software, such as Close-Up, Co-Session Remote, or the latest Windows-based pcAnywhere and Carbon Copy 2.0, allow you to dial from one PC into another and take control. They also let you establish gateway services, where one PC on the network dedicates a small percentage of its CPU time to redirect information between its serial and network ports, so that from a single modem connection, a remote user could theoretically take control of any PC on the network.

These connections take place in real-time and so are expensive if long distance. Both pcAnywhere and Carbon Copy include good file transfer utilities though, and work by running the host PC's display in a window under Windows — simple to use and operate.

The information sent includes optimised display instructions and input, rather than full bitmaps of the screen of the host, so for most Windows applications performance is only two to three times slower than normal. The exception is vector drawing programs that transfer large amounts of screen redraw information.

This is a good approach for accessing services in real-time, such as large non-client/server databases that would be too slow to download or use over a remote network connection.

Remote network dial-ins are ideal for file transfer. You gain real access to full network services, if at a significantly reduced rate. A V32-bis modem is the minimum you'd use, however, and you should run all applications from your local hard drive.

These systems work by redirecting packets over a serial line. Hardware solutions include the Shiva NetModem, which can also be used for shared dial-out access. Software solutions vary, but the one to watch is the remote access system bundled in this next release of Windows for Workgroups '3.2' (see *APC* Newsprint, October 1993). This lets you attach a modem to any PC on a workgroups network, and dial in through it to access full network services, including network services that extends beyond the Workgroups LAN, including NetWare.

Lotus Notes gives the best indication of the future, with its client-server architecture. Remote users maintain a subset of relevant databases and applications on their notebook. When they attach to a LAN, emails are automatically routed appropriately, and the databases update in close to real-time. When working over a serial connection, databases and email replicate in batches of updated information, combining the benefits of store and forward communications with the shared information pools of traditional database management systems.

The combination allows remote workers to function off-line without sacrificing their network information systems, and without having to learn arcane connection systems. ✎

You could try stuffing 50 remote-access PCs into your phone closet.

Now it's easy to scale your remote networking efforts.

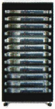
You'd never *plan* to use a multitude of dedicated PCs for remote networking. But chances are you've already started implementing that kind of configuration. Two, three, four PCs at a time—it adds up in time, money, and space.

Before you and your phone closet get completely out of control, consider LanRover™/E.

Get centralized management and top-level security.

The LanRover/E is a multi-port remote networking server for Ethernet that sits on your NetWare® network. It comes in 4- or 8-port models and can pack 100 lines into less than two vertical feet.

This is transparent access that *you* control. And you never have to leave your chair to manage all your ports. Shiva Net Manager—Shiva's powerful configuration software—lets you manage and configure all your LanRover/Es from one desktop, using DOS or Windows™ over SNMP.



Set-up and management are a snap: save all your critical data in user and configuration files, and download them simultaneously across the network. Or configure your LanRover/Es separately.

You also get two formidable security options: LanRover's own multi-level set-up as well as the NetWare Bindery. It even supports third-party security systems.

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So whether you have four lines or 400, the LanRover/E makes management quick, convenient and secure.

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If you tend to be short of time and space, you owe it to yourself to check out the LanRover/E family of products for NetWare and AppleTalk® Remote Access. When you examine *all* the issues—performance, scalability, affordability, centralized management, security—it's the only remote networking solution that makes good business sense.

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WIN an NEC UltraLite Versa worth over $8000

Everyone wants an active matrix colour notebook and **APC** and **NEC** are pleased to offer you a chance to win this state-of-the-art machine. The **UltraLite Versa/33C** is NEC's top-end offering and features a 9.6in 256-colour active matrix screen. Our reviewer was very impressed with this machine and found it to have long battery life, strong performance and a great keyboard. **"The Versa really is distinguished by superior design, both in its engineering and aesthetics."** To enter the competition, simply complete this short survey on portable computing and complete the slogan at the end of the questionnaire. Survey information is gathered for research purposes only and will not affect the selection of prize winner. The writer of the most apt and original slogan will **win the NEC notebook**. Good luck!

1) Do you currently own or use a portable PC?

☐ Yes, own
☐ Yes , use
☐ No

If yes, please give details:
Brand (please write in):____________________
Processor (please tick):
☐ XT/286/68020
☐ 386/68030
☐ 486/68040
Screen (please tick):
☐ Colour (passive matrix)
☐ Colour (active matrix)
☐ Mono

2) Do you, personally, anticipate purchasing a notebook PC, either at work or for your own use in the next 12 months

☐ Yes
☐ No

If yes, please give details where known:
Brand (please write in):____________________
Processor (please tick):
☐ XT/286/68020
☐ 386/68030
☐ 486/68040
Screen (please tick):
☐ Colour (passive matrix)
☐ Colour (active matrix)
☐ Mono

3) Are you personally involved in the portable PC purchase decision process at work?

☐ Yes
☐ No

If yes do you: (please tick all that apply)
☐ Make requests for new portable PCs
☐ Evaluate brands
☐ Specify or recommend the configuration of portables to be purchased
☐ Specify or recommend the brand of portables to be purchased
☐ Specify or recommend the supplier or distributor to be used
☐ Authorise the purchase of new portable PCs
☐ Have the final say on the configuration
☐ Have the final say on the choice of brand
☐ Have the final say on the supplier/distributor

4) During the past twelve months how many portable PCs were you personally involved with the purchase of? *Please be as accurate as possible please do not enter ranges.*

	For own/organisation use	For resale
Processor:		
XT/286/68000	______	______
386/68030	______	______
486/68040	______	______
Screen:		
Colour (passive matrix)	______	______
Colour (active matrix)	______	______
Mono		

Approximate dollar value of portable PCs purchased during the past twelve months:
For own/organisation use $____________
For resale $____________

5) During the next twelve months how many portable PCs do you anticipate personally being involved with the purchase of? *Please be as accurate as possible please do not enter ranges:*

	For own/organisation use	For resale
Processor:		
XT/286/68000	______	______
386/68030	______	______
486/68040	______	______
Screen:		
Colour (passive matrix)	______	______
Colour (active matrix)	______	______
Mono		

Approximate dollar value of portable PCs purchased during the past twelve months:
For own/organisation use $____________
For resale $____________

Complete the following in no more than 10 words:
I want to win the NEC UltraLite Versa because....

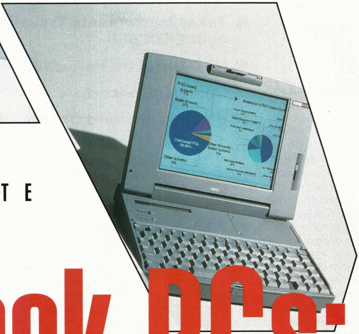
Name:____________________

Daytime phone number:____________________

Send your completed entry (copies are acceptable) to
APC/NEC Competition
GPO Box 7052
Sydney NSW 2001

CONDITIONS OF ENTRY

1. Instructions on 'How to Enter' form part of these Conditions of Entry. Entry is free and open to all residents of Australia other than employees of ACP Publishing Pty Limited ACN 053 273 546 and NEC Pty Ltd their families and associated agencies.
2. The contest closes last mail Friday, December 3, 1993. Enter using the coupon provided (in SA entrants may send a facsimile – only one per person). The contest will be judged by a panel appointed by ACP Publishing Pty Ltd on Friday, December 10, 1993. The judges' decision in relation to any aspect of the competition is final and binding on every person who enters. No correspondence will be entered into. Chance plays no part in determining the winner. No responsibility is accepted for late, lost or misdirected mail. All entries become the property of ACP Publishing Pty Limited, the promoter, 54 Park Street, Sydney, NSW 2000.
3. First prize, valued on October 7, 1993 at approximately $8,468 consists of a NEC Ultralit Versa/33c colour notebook computer. The prizewinner must be over the age of 18 years, or accompanied by an adult. Prize is not transferable or redeemable for cash. Any change in value of the prize occurring between publishing date and date the prize is claimed is not the responsibility of the promoter.
4. The prizewinner will be notified by telephone and security post and published in the February 1994 issue of APC.

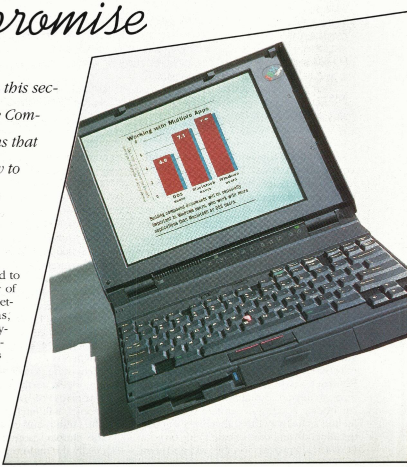


BY JEREMY WHITE

Notebook PCs:

The art of compromise

The key to mobile computing is the notebook. In this section of our special, 'The Essential Guide to Mobile Computing', we examine the features and specifications that make for a good commuting companion, and how to differentiate comfort and performance levels from price.


Working with Multiple Apps
4.9
7.1
DOS users
Macintosh users
Windows users
Building compound documents will be especially important to Windows users, who work with more applications than Macintosh or DOS users.

Notebook computers are expensive. If you've acclimatised to desktop PCs with 486DX Windows performance, plenty of drive space and RAM, good-quality colour displays, network connections and high-speed communications, you're in for a shock. A decent notebook can cost anywhere from two to three times the price of an equivalent desktop PC. For the cost of the Editors' Choice notebooks in this comparison, you could almost buy three of the Editors' Choice PCs from our October *APC* comparison of DX/33s desktops.

Considering the dollars you'll be parting with for the acquisition, notebooks still weigh too much, their batteries don't last long enough, and their operating systems have not been sufficiently adapted for the rigours of trekking between office desktops, home studies, hotel rooms, building sites and seminar halls.

Australian Personal Computer
EDITORS CHOICE

- **Texas Instruments TravelMate 4000E DX2/50**
- **NEC UltraLite Versa/33C**
- **Compaq Concerto**
- **Hewlett-Packard OmniBook**

These four notebooks aren't for everyone, and depending on your priorities, they may be far from the best value for money. We have no doubt, however, that they are the best. Each represents a spirit of innovation and even risk, and they have pioneered features that will trickle through the notebook market, and come to benefit everyone. Each also has its flaws, and some of these are serious.

Two of these models are strictly speaking 'out of series' — the Concerto and OmniBook. The notebook market is defined by its diversity, however, and what is exceptional today will probably be commonplace within six months.

Texas Instruments has pushed performance to a new high with its TravelMate 4000E. It's an indication of TI's engineering class that while clones used DX2/66 processors, complete with visible heat sinks and fans, the TravelMate outperformed them, remaining cooler, better featured and lighter. The TI's raw battery life is as poor as you'd expect for a full DX2/50-based notebook with active matrix colour, and it lacks PCMCIA, but its power management, design and performance are superb.

NEC's UltraLite Versa/33C could not match the performance of the DX2/50, but it kept pace with DX2/66 machines and undercut the other name-brands for price/performance significantly. Its best of class battery life, expandability and upgradability — with PCMCIA, removable screen and hard drive, and battery-replaceable floppy drive — combined with beautiful design, an excellent keyboard and low weight to make an excellent package. NEC should add a QuickPort connector or integrated trackball, and reduce the size of their AC adaptor, however.

The Concerto is a notebook with pen input, innovative compartmentalised design, and first class performance at a reasonable price. It combined the third best raw battery life with the third best overall performance — a genuinely impressive combination. Its monochrome screen was legible, it's keyboard good, and its ergonomics superb.

As a superportable, the OmniBook didn't rate for performance, the non-backlit screen couldn't compete, and the keyboard was relatively stiff. However, with software in ROM, flash memory, instant-on, 1.3kg weight, clever mouse, around 10 hours of battery life, infra-red connectivity and two PCMCIA slots, this is one hell of a little beast. Here is the first Windows PC capable of catering to mobile, as opposed to shifting, professionals.

Ones to watch include the new Toshiba T1950CS, the just released IBM ThinkPad 750C and the AST Bravo. A Highly Commended goes to IBM for its ThinkPad 720C. The new releases from Zenith also make it a company to watch.

If you use a top-line notebook though, you'll fall in love. There'll be days of temper and tears, but a good notebook becomes a companion. Your work, your plans, all the information usually scattered between draws, folders, file servers and desktop organisers is invested in your travelling partner. You're freed from other people's information management systems and their limitations, and happily trapped by the tyranny of complete responsibility for your computing work environment.

We think you'll be happy despite the flailing muscles in your arms and the ache at the pit of your back as you lug your PC, external modem, spare battery packs, Ethernet adaptor and AC power units through airport lounges and in and out of car boots. You'll also survive the sinking feeling as halfway through a flight to Perth the alleged four hours of battery life on your PC yet again proves closer to two, and learn to cope with the incessant beeping of impending screen blackout.

It is cost, though, that will determine which brand and features you can choose. For this issue, we've abandoned cost as a criteria for Editors' Choice. If you want a top-flight notebook, you'll have to pay between $8000 and $10,000 for it. You can, though, purchase a good unit for well under $4000, which is still expensive compared to current desktop prices. Much below this price and the compromises negate the cost benefits markedly.

The brilliance of colour displays, the convenience of being able to take your work wherever you go — without sacrificing computing power — and the compact design, sleek aesthetics and comfortable ergonomics of our Editors' Choice notebooks, will enchant you despite their weight, failings and cost.

The rampant popularity of notebooks, especially the mid-range to high-end units from the big-name vendors, articulates that many people are prepared to pay for quality when it's invested in a PC that stays by their side 24 hours a day and becomes a focal point of their working hours.

Even the most expensive notebooks available still represent compromise; the lower your expenditure limit, the more compromises you must accept. We've tried here to determine which are the optimal imperfections to tolerate at different price points.

Families on the move

Notebooks vary greatly in form, features and function. They are descended from and have largely replaced 'laptop' computers, although the lineage is misnomered as these are the first PCs that can feasibly be used on one's lap. A notebook should be roughly the size of an A4 sheet of paper, no more than half a dozen centimetres high, have a travelling weight of less than 4kg, and a minimum raw battery life of around two hours.

To be useful, it should offer the equivalent of reasonable desktop computing power, have a full size keyboard, an optional internal modem, a reasonably-sized hard drive, and power management capable of extending real-usage battery life beyond four hours.

While laptop computers have largely been replaced by notebooks, the portable or transportable remains as a buffer between these and full desktop systems.

Typically, portables are aimed at providing an uncompromised desktop system in a mobile form. We consider one of the more interesting of these — the new Toshiba T6600C — along with our reviews. Such machines are generally reserved for specialised use, and while they provide true high-end performance, have limited markets. The T6600C, for example, is targeted at mobile multimedia presentations with full sound, CD-ROM and digital video, and Compaq specialises in transportables usable as on-the-fly network file servers.

If notebooks are expensive, however, these units, offering spare drive bays and expansion slots, are for royalty. They are usually based on EISA bus architectures, with prices between $10,000 and $15,000.

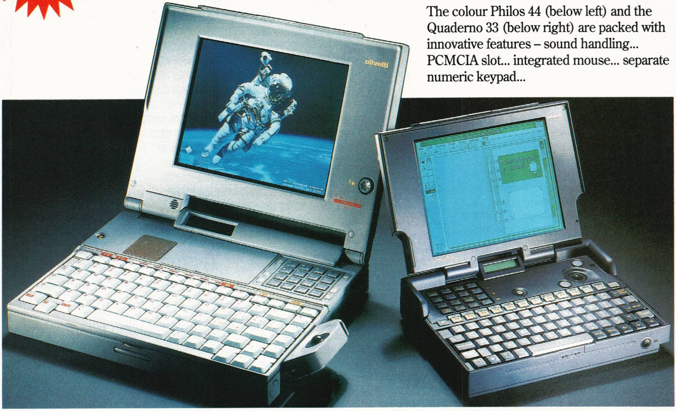
Below notebooks in power, but not so greatly in price, are another genre of PC known as superportables, or subnotebooks, although the distinctions are disappearing as the weight and size of notebooks decreases and the power of subnotebooks increases.

Hewlett-Packard's OmniBook and Zenith's Z-Lite, both of which use 386-based processors, are examples of subnotebook computing. The OmniBook weighs just 1.3kg, opens instantly to wherever you last closed down, lasts for 10

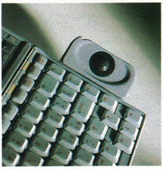
NEW

6 multi-featured portables from as little as $2,395 (RRP inc. tax)

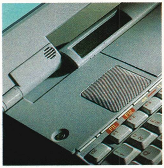
The colour Philos 44 (below left) and the Quaderno 33 (below right) are packed with innovative features – sound handling... PCMCIA slot... integrated mouse... separate numeric keypad...



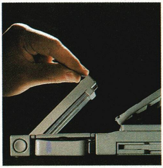
A separate numeric keypad — as on desktop keyboards.



A fully-integrated, pop-out, two button, trackball mouse.



Microphone & speaker — records/ plays back; plays multi-media s/ware.



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hours on AA batteries, and has Windows, DOS, Microsoft's Word and Excel, plus half a dozen utility programs stored on an upgradeable ROM card.

The OmniBook is the first on-the-trot Windows PC. You can open it up and work as you go almost anywhere. It's based on a lowly AMD 386 low-consumption chip, and has only 2M of RAM, but with a full-sized keyboard and decent integrated 'mouse-on-a-stick' pointer, it has features that will appear in other vendor's products.

Whereas the variations from one desktop PC to the next are limited to insignias and choice of box type, notebook design remains an active segment of PC research and development. Fitting full performance in an A4-size case, suiting the highly sensitive components required to a rugged form that can handle abuse, and adapting keyboard and screen to working in less-than-perfect office conditions all require innovation, and innovation sparks diversity.

The result is a host of different approaches to everything from heat dissipation and casing integration to choice and placement of mouse controller.

The bulk of innovations have been from the high-end vendors that dominate the market.

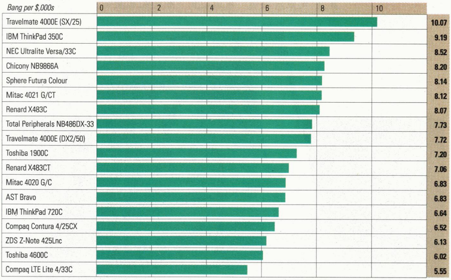
Toshiba pioneered on-road usability and durability, with quality keyboards, lightweight case designs, rugged hard drive components and high-grade displays. The company also developed many of the power management features now common across notebooks, including 'bookmarks' and auto-resume, and variable power consumption modes. They were also one of the first vendors to adopt PCMCIA as standard, and design an entire unit around a low-consumption 3.3V chipset.

Apple's Powerbooks, with a market-share of somewhere between 20 and 25 per cent, have spurred acceptance of the GUI notebook, with features optimised for roaming point-and-click. While PowerBooks have been derided for low battery life and high weight, their integrated palmrests and more-usable-than-most trackballs, inbuilt networking, and sleek design have captured a market well beyond that of the Mac generally.

IBM was once a well-loved joke in portable computing, but its ThinkPads have reengineered popular thought about not only its products, but what the company is capable of doing. With beautiful 10.5in active matrix displays, which were co-developed with Toshiba, and its innovative TrackPoint II cursor — a miniaturised pressure sensitive joystick between the G and H keys for mouse control — IBM has not only recaptured credibility, but given other vendors something to emulate.

BANG FOR BUCK

Price vs performance, features & portability



Compaq's LTE Lite has been a connoisieur's notebook since its release, with low weight, a great display, and excellent expansion options. Worldwide, something like 35 per cent of the company's LTEs ship with a docking station. The small trackball mounted at the bottom right of the screen on LTEs is also regarded as one of the best integrated pointers available. With its Contura series, Compaq also pioneered value-line notebooks, incorporating a subset of the most important and useful features from its high-end machines in rugged units with lower performance and less expensibility. Its dual-scan passive matrix colour Contura 4/25C is a masterpiece of compromise.

For portable performance, no company can match Texas Instruments. The company has been slow to get approval for its internal modems in Australia, and has taken a while to get the hang of giving users top-line screens and pointing devices, but its TravelMates combine low weight, rugged integrated casing and componentry, with the most advanced engineering-driven performance available. TI was first to market with a DX2/50 notebook, and while clone vendors have introduced DX2/66 notebooks, we're not worried about the TI spontaneously combusting, and it outperforms these units overall in any case.

While NEC pioneered the notebook genre with its original UltraLite, until this year it had been left behind the field. The UltraLite Versa corrects this. NEC now has the most expandable and upgradable notebook on the market, with dual PCMCIA, a removable screen, removable hard drive, a floppy that can be replaced by a second battery pack, beautiful design and comfortable ergonomics. The Versa also introduced local bus video to notebooks.

Compromising features

Notebooks are driven by compromise, and the price you'll pay for a notebook will be determined by how many compromises you can accept.

The most evident and cost impacting choice of compromise is the display. You now have five choices; active matrix colour, active matrix monochrome, passive matrix dual scan colour, passive matrix colour, and greyscale LCD. The differences between these different display methods are incredible.

A simply greyscale LCD is the cheapest option. You'll pay anywhere up to $3000 less for a monochrome-based notebook than for an otherwise identical active-matrix colour notebook. The best of these greyscale screens is Sharps, which was used on just under half of the notebooks we evaluated. You get some ghosting, and the display brightness and readability varies under different lighting sources and levels, but these screens are perfectly usable, and if you require colour or clarity only occasionally, the change left over from not choosing active matrix colour could buy you half a dozen external desktop monitors.

Passive matrix colour screens come in two forms — in both cases, for each row and column of pixels on the LCD display, they use a single transistor. The first sort are relatively cheap to produce, and only add between $750 and $1000 to the cost of a notebook, but suffer the same problems as greyscale screens. Their quality also varies widely. The newer STN dual-scan passive

Review: Apple Newton MessagePad

BY CHRISTOPHER BARR

More than a year after Apple's chairman, John Sculley, added the term Personal Digital Assistant (PDA) to the lexicon of computing, the $1495 Apple Newton MessagePad has arrived. The Newton is Apple's first PDA, and was developed in conjunction with Sharp Electronics Corp. Sharp is selling its version called ExpertPad. The Newton is a handheld device that at first glance will delight and amaze you, but leaves you wanting more. The Newton foundation is solid, but missing pieces include critical wireless communications.

As the name implies, the Newton is a note taker, and it fits comfortably in your hand as you write on its 4.75in (diagonal) LCD panel. Although the Newton's handwriting recognition engine is one of the best we've seen — it translates cursive writing and printing, or any combination of the two — it remains far from perfect.

The Newton comes in three versions — depending on whether a modem and a connection to your desktop is included. But every Newton comes with an address book and a calendar with a to-do list. The Newton will store up to 250 name cards with name, title, company, address, and three phone numbers), 200 notes of up to 50 characters, 500 calendar appointments, and 35 screens of uninterpreted text and drawings.

What makes the Newton stand out over the Tandy/Casio Zoomer Personal Digital Assistant are the little touches. You can erase ink and text from both, but on the Newton the erased data becomes a cloud of dust before disappearing. The Newton's Intelligent Assistant feature uses key words to launch macro-like functions. When you write the phrase "fax Hillary" and press the Assist icon, the Newton will format a cover page for the message and use Hillary's fax number from the address book. Other key words include call, find, mail, and print. Write "schedule," press the Assist icon, and an appointment is added; write "remember" and an item is added to the to-do list.

Like the Tandy/Casio, the Newton uses an untethered, passive pen. You launch applications by pressing preprogrammed icons at the bottom of the display. The applications, as well as the operating system, are stored in 4M of ROM and run in Newton's 640K of system RAM. The operating system, which Apple calls Newton Intelligence, runs on a low-voltage 32-bit ARM 610 processor operating at 20MHz. The reflective LCD panel on which you write has a resolution of 240 by 336 lines and a contrast ratio of 6.4:1, well below the average of most notebook PCs.

The $1499 ExpertPad from Sharp Electronics differs from Apple's Newton only in its packaging (and marginally in price). The ExpertPad is grey; the Newton is dark grey/green. The Expert has a flip-top door to cover the screen, while the Newton has a slip-on leather case. The pen holder on the Newton is external, but it fits inside the ExpertPad's case. Otherwise, they are the same machine.

The Newton comes equipped with a serial port (it can be used to print to parallel printers with an optional cable), and an infrared transceiver to beam information from one Newton to another (up to three feet away). A Type II, Release 2, PCMCIA socket can be used for additional storage or to add applications. Apple ships a PCMCIA ROM card with the Newton that contains a game to teach new Newton owners how to write to attain the best recognition. It serves double duty by instructing you how to use the PCMCIA socket. (Applications on a PCMCIA card appear as menu icons when you press the Extras button).

The Newton is powered by four AA batteries, which are included, or you can buy an optional rechargeable nickel cadmium battery pack. A lithium battery is used for back-up power. Because we examined a preproduction unit, we are unable to report accurate battery usage, but Apple claims most users will get from five to 32 hours on a set of batteries. In fact, that is considerably less than the Tandy/Casio's 100 hours.

Like a member of a royal family, the Newton's future is well planned. Matsushita Electric Co licensed the technology from Apple and plans to develop its own newton devices. Motorola is developing the MessageCard, which is a PCMCIA pager. In addition, Siemens and Rolm are working on the NotePhone — a telephone for the Newton. These first three versions of the Newton will be followed, beginning in 1994, by a family of various configurations.

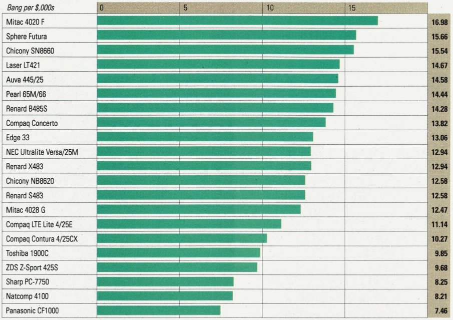
A number of third-party software vendors have hitched their wagons to the Newton's star. Later this year you'll see applications like travel guides from GeoSystems, business forms from PenMagic, and games from Blank Berlyn, & Co.

Newton is very much targeted for vertical applications, too. Apple released the Newton Toolkit, which includes an object-oriented language called NewtonScript, that allows developers to easily create commercial or company-specific programs on a Macintosh. A Windows version is scheduled for 1994.

While the Newton's cursive handwriting recognition and well-designed applications are appealing, you'll soon say, "where's the beef?" More applications are available on the Tandy/Casio, but it doesn't deliver with the Newton's flair. It will take about a year before enough third-party applications will be available to make the Newton worth the price, and maybe longer before a company can develop meaningful vertical applications. In the meantime, your Newton will make you the life of the party. For more details, contact Apple on (02) 452 8000 and Sharp on (02) 831 9111.

MONOCHROME BANG FOR BUCK

Price vs performance, features & portability



matrix colour displays developed by Sharp, and first introduced on Compaq's Contura 4/25C, are only an extra $500 again, and bring the display quality nearly to that of an active matrix screen by splitting the display into two vertical bands, and effectively doubling the refresh and clarity. If you need colour, this is the best choice on a budget.

A full active matrix colour display is, in the opinion of all our reviewers, more crisp than all but the very best desktop displays. You get instant screen refreshes, 256 gloriously clean colours, and none of the washing, fading or ghosting for which portable screens are known. This is done by using three transistors for each pixel on screen, and they are often referred to as TFT (thin film transistor) displays.

The drawbacks of active matrix colour have mainly to do with cost — a premium of $3000 or more over an equivalent monochrome system. Yields for producing active matrix displays are low, and they suffer seriously from a phenomenon known as 'pixel drop-off', where tens of tiny holes appear in your display over time. The low yields and high fault inclination of these displays means that you pay a premium.

If you can't afford this premium, ensure you don't go anywhere near a notebook with one, especially not IBM's 10.5in beauty — most TFT dislays are 8.5in. Once you've seen one, all your nightmares will be filled with dollar signs.

The increased complexity of active matrix display technology, and the increased number of transistors required also means that TFT displays are far heavier than greyscale monochrome displays, and require more bulky casing. Compaq offers an interesting alternative with its LTE Lite 4/25E — monochrome active matrix. For a price that compares very well with similar specification units from NEC, Compaq offers crisp, clean greyscale.

The next major impact on price/performance is the processor used.

Several of the notebooks in our survey suffered for their use of 'cut-down' chip technology, particularly those based on the Cyrix 486SLC chip. This chip operates at 16-bit internally, and at equivalent clock speeds is well behind the performance of Intel-based systems. IBM uses its own 486SLC2 chip, which again operates internally across a 16-bit data path, although its processor performance remained above average despite this.

At the other end of the spectrum were notebooks using full Intel DX2/50 and DX2/66 chipsets. You would expect major drawbacks on notebooks using these chips — power consumption and heat build-up. One of the DX2/66-based clones even had an internal fan, which is controlled by a thermostat linked to CPU activity.

The TI TravelMate, which used both a DX2/50 chip and a power-sapping active matrix display, did not suffer the heat build-up of the 66MHz clones, although it did become cosily warm. Its raw battery life suffered, however, clocking just one hour, 20 minutes on our battery rundown tests. On the other hand, the TI also blitzed our performance benchmarks easily, illustrating the compromises required in choosing a notebook perfectly.

By far the best performance/battery life/price combination was provided by machines based on the 3.3V low power-consumption Intel 486SL chipset. This chipset is designed to maximise not only battery life, but general PC energy efficiency, and in one form or another the technology used will end up in desktop PCs. Support is included in the chipset for software-controlled power management features, such as sleep mode, running the processor at half-clock speed, and powering down peripherals such as the hard drive and screen.

The best results for both raw battery life and real-world usage tended to come from 25MHz 486SL systems, even those with colour displays. Zenith's active matrix colour notebook, the 425Lnc, managed two hours 39 minutes of raw life, and NEC's monochrome Versa/25M managed nearly three hours, 15 minutes.

Performance from the 33MHz chipset was also excellent, with the Versa/33C and Compaq Concerto especially good performers, holding their own against full DX2/66 clones.

Power management is critical. Good power management features can extend effective battery life from two to as high as five or six hours, depending on your work patterns. Methods used range from TI's powering down of the processor on a micro-level between individual keystrokes, to just blanking the screen and spinning down the hard drive after a period of inactivity.

Microsoft and Intel between them have set the standard for combined hardware/software management. Microsoft's Advanced Power Management standard allows the processor to be clocked down, drive and screen powered down, and individual ports and components put to sleep, and the low voltage 3.3V Intel chipset cuts back general levels of power consumption, while co-operating with software-controlled management techniques.

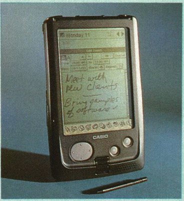
Good systems support both manual and automatic suspend, where the system goes into a sleep mode using five per cent or less of its standard consumption, and hibernation, where the contents of RAM are dumped to spare drive space, and the unit is powered down completely. When the system is awoken, the previous operation is completely restored after a short delay.

HP takes power management one step further with the OmniBook. Flash memory and software in ROM allow for 'instant-on', where the operating environment is completely retained even when the system is completely deprived of power. Toggling the on/off button really does toggle your work on and off. Combined with flash-disk

A walk through the Tandy/Casio Zoomer PDA

BY HELEN DANCER

The acquisition by AST of Tandy Corp's PC products division has meant that, in a complex fall out of responsibility, AST has become the driver for the new PDA contender, the Zoomer. Your faithful scribe was one of the privileged first to test drive a beta model so new it didn't even have a serial number, when Philip Wong, AST's vice-president, Asia Pacific, visited Australia in late September. From first sight it is almost easy to mistake the Zoomer for a portable CD player, with its raised and rounded plastic cover and squarer-than-Newton shape.



Offering similar functionality, but not based on Newton technology, the Zoomer weighs a little over half a kilo and claims 10 hours' battery life on three small AA-size batteries. It works on the GEOS operating system from GeoWorks, thus its ROM-based functions, which give it the same uses as the other PDAs on the market, are proprietary. The difference is in the availability of applications, according to Bonnie Sundberg from TCG.

TCG markets and distributes the GRiD Systems products in Australia, and despite the acquisition by AST, will continue to market the Zoomer in Australia. "The Zoomer features a SunDisk card on PCMCIA storage, which allows the Zoomer to run MS-DOS and other business applications, along with the PenRight! API developed by GRiD Systems, which is used by 80 per cent of all pen-based systems currently in the marketplace."

Another feature that makes the Zoomer different, according to Sundberg, is the ability to attach a barcode reader. These differences leave the impression that the Zoomer is aimed at an altogether different customer from the other PDAs currently in the marketplace. However, there are also similarities.

The Zoomer suffers the same problems in handwriting recognition and lacks the learning games common to both the Sharp ExpertPad and the Apple MessagePad, both designed to acclimatise machine to user and vice versa. It will more readily overcome the problems, however, by storing names and notes in the handwriting form, rather than trying to translate them into words it understands. "Why not?" asks Philip Wong. "When you write somebody's name and phone number on a scrap of paper, you never expect it to suddenly transform itself into typed script do you? What these PDAs offer is the ability to store all those 'pieces of paper' type notes, and call them up instantly."

With the widespread popularity of notebooks, and PIM software such as Lotus Organiser, the question then arises: why would a person who bought a notebook need a PDA? Techno toyhood aside, there's only so much space in a briefcase, and having a machine for each task seems pointless. To answer the question, Wong gave a graphical demonstration. "You want to know whether I can have lunch with you on Thursday? Just a minute." He reached over and turned on the notebook. As it churned and whizzed he said to me, "I'll be with you in a minute." Looking at his watch, he sat back in his chair. Thirty seconds later, he said to me again, "I still can't tell you, but it will just be another minute." Point taken. To answer the same question with the PDA took about 20 seconds, from the time it took to boot up, tap on the date book and tap on the particular day's activities. Another 20 seconds entered the appointment and closed the conversation.

The Zoomer is expected to retail at around $1225.For more details, contact TCG on (02) 699 8300.

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storage and a non-backlit screen, the OmniBook will typically run for more than nine hours.

Personal Computer Memory Card International Association (PCMCIA) cards are also a feature for which to check. While PCMCIA devices have been slow to take off, taking off they are, and they offer the lightest and most flexibile method of adding heavy duty features to a notebook. The two variants worth noting, and between which you will usually have a choice, are Type II and III. Both are the size of a credit card.

Type III devices are larger, and will usually be reserved for extra hard drive capacity, so usually you will only get one slot, as opposed to two Type IIs. Type IIs are currently more useful, and we recommend that in most cases you purchase a notebook with either two free slots, or bundled with a modem and Ethernet card. For example, Xircom currently offers a PCMCIA Ethernet adaptor, and Banksia Technologies now offers a 14.4K fax modem.

Pointing devices and keyboard vary widely between vendors. The best quality keyboards based on our reviewers' feelings were those on the Toshiba T4600C, the NEC Versa, and the Texas Instruments models. Keyboard quality is very subjective, however, and we suggest that you annoy shopkeepers by insisting on spending a few hours with your potential purchase's particular variant before committing to it for life.

Little things like the keyboard take on substantial significance when you can't replace it down the track. Look for comfortable travel, as close as possible to standard 101-layout, and watch out for clicky or sticky keys.

The appropriateness of individual pointing devices also varies subjectively. Our favourites — and we disagreed considerably — included the screen-mounted trackballs used by Compaq, the BallPoint with QuickPort connector, Apple's large front-mounted trackball on palm-rest, the clever little paddle-pop mouse on the OmniBook, and of course IBM's TrackPoint II, which some hated and some loved.

None of these solutions was anywhere near perfect, and it's advisable in most cases to carry an external mouse for when you are able to use it.

With current technology, we recommend a minimum of 120M drive and full 486-based processor — not the Cyrix-based SLC, which is left well behind in benchmarks. Notebook RAM prices are ridiculously high, so while if possible you should upgrade to at least 8M of RAM, you'll probably be stuck with 4M for some time as standard.

Reasonable high-performance internal modems are hard to come by in Australia. Compaq atones for its missing PCMCIA by offering an Austel-approved internal fax modem. While other vendors say they have an internal modem option, *APC* hasn't seen

Performance and features: how we tested

In preparing this issue, we used PC Magazine Labs' Hardware Benchmark Tests, Release 7.01, to predict PC processor, memory, video subsystem, and disk performance using DOS applications.

Ben Gerholt and Stuart Bowman headed APC Labs' testing and specification comparisons for the notebook feature, with Jeremy White as Project Leader. David Lin and Helen Dancer both worked on product evaluations.

Scores have only been provided for units that were able to complete all tests, and were based on at least a 486SLC processor, were within notebook size and weight, and could run from battery power. There are units, such as the OmniBook, Z-Lite and T6600C that were 'out-of-series'.

Each of the four DOS scores we report is the weighted harmonic mean of the results from several tests, expressed either in terms of throughput or in operations per second. All of these results are summarised in a composite score called the DOSMark.

We also used the Windows Benchmark Tests (Winbench), Release 3.11, to obtain the Graphics WinMark and Disk WinMark scores, and used the Windows Applications tests to simulate a multitasking environment. All of these tests predict relative performance levels using popular Windows applications.

The processor score is a measure of the CPU's performance and its interaction with cache and main memory. It is derived from tests that use small and medium-size instruction mixes, along with either the floating-point calculation test or the coprocessor test (depending on the presence or absence of a maths coprocessor). The score indicates how well the CPU and cache subsystems would execute common DOS and Windows applications.

Each of the tests was run three times for each PC, and scores averaged.

The memory score is compiled from 8, 16, and 32-bit extended-memory read and write tests, as well as 8 and 16-bit conventional-memory read and write tests.

The disk score measures throughput using standard DOS INT 21h file I/O calls. The tests measure the speed of file reading and writing, both sequentially and randomly, for a range of file sizes from 256K to 32M. The tests are performed without software disk caches installed.

The video score is based on direct-to-screen text-write and graphics-write tests. Together, these tests reflect the video throughput for a standard EGA/VGA adaptor running DOS applications.

The DOSMark score is a composite rating derived from the processor, memory, video, and disk test scores. The DOSMark indicates a PC's ability to run DOS applications.

The Graphics WinMark score is based on 12 Windows graphics and text functions derived from extensive profiling of popular Microsoft Windows applications. The score is expressed in megapixels per second (a megapixel is defined as 1,048,576 pixels).

The Disk WinMark score is based on testing techniques adapted from the DOS disk tests to reflect operations within the Windows environment. For this portion of the testing, the systems were configured with up to 2M of SmartDrive cache.

Battery Life shows the raw length of time it took for notebooks to rundown using ZD Labs battery rundown tests from a full charge to losing power altogether with power management disabled. The 'real' life of batteries depends heavily on individual usage patterns, and which power management features you choose to enable. We've found running Windows that the worst case is the case about which you want to know.

Bang for buck

The 'Bang for buck' tables show how notebooks compare for price vs portability, performance and features. We've split our test results into two groups, monochrome and colour, as this single criteria heavily distorts dollar/feature/performance projections.

Obviously the passive matrix notebooks — being much cheaper — rate better than active matrix due to the large cost differential amongst the colour units, although the NEC Versa/33C and some others compare well.

The 'Bang for buck' figures between reviews (and really between these three sections) should not be directly compared, as they refer to relative performance within a given set and features of an individual in a given set of PCs, and the specification weightings will vary according to the product range being surveyed.

To calculate the 'Bang' figure, we combined relative scores for performance, features, and portability for a total projected score out of 100. The 'Bang for buck' table is produced by dividing this score by a notebook's cost in thousands of dollars.

To arrive at an Overall performance figure, we scored relative performance in each of our benchmark tests as a percentage between the highest and lowest scores for the group for that test, with each benchmark test given equal weighting.

To generate the feature score, we weighted scores for installed hard disk capacity and RAM, expansibility and upgradability, external and internal display specifications, available ports, PCMCIA slots, internal modem bay, integrated networking options, and extras such as accessories and warranty and support. We have also included subjective ratings of keyboard, pointer and display grade.

The portability figure was generated by combining scores for relative weights (as a percentage between the best and worst results), worst-case battery life (raw rundown results in our battery test), and power management features. As we have said, true battery life depends directly on individual usage patterns, and we have not attempted to rate it here.

Obviously, different users would give different weightings to different features and benchmarks. Is Windows graphics or DOS disk performance more important to you? Is the capacity for extra RAM more important than PCMCIA? Are other factors like integrated networking more important still? Is active matrix colour worth $3000, or would you rather have a notebook with good support for an external display.

As always we advise that you treat these projections with caution, because like any they rely on a variable set of assumptions. We feel, however, that the scores provide a balanced view of the relative values of each machine we reviewed.

too many of them actually approved and functioning, so if you feel you need an internal modem and the notebook you're eyeing lacks PCMCIA, check that the vendor's optional offering is approved and shipping.

Weight is criteria. A good sized, weighty notebook might look more durable, but carrying it with you everywhere you go will quickly lose its appeal. Weight has been coming down, but decreases have been countered by the increased weight of longer-life batteries, and the heaviness of active matrix display technology.

Nonetheless, TI's monochrome models are down under 2.4kg for a full DX2/50 notebook, and even full colour units typically weigh 2.7kg. Remember to calculate the full travel weight, including the bulk of an external AC adaptor, serial and power cables, potentially an external modem and an external mouse.

Carry bags are a must. You can get away with popping a notebook in a briefcase occassionally, but a reinforced and padded specialised carry bag will pay for itself quickly.

Most carry bags are of the leather or nylon travel-bag variety, with pockets for accessories and papers. The best of these come from Toshiba and Texas Instruments, although there are third parties who offer excellent alternatives. Another alternative is Compaq's. You get a large, very sturdy, A3-size case with dividers and organisers, and inside a small handheld bag just large enough to hold a Contura or LTE on its own.

Matching your needs

The most important part of any notebook computer is easy to define; the user. Reviewing anything always has a heavily subjective element. While specifications tables, benchmark performance charts and

Size is everything.

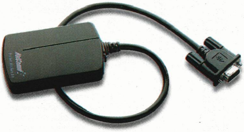
It's no exaggeration to say you're looking at a revolution in the portable modem market.

Up to now portable modems lacked the grunt of desktop modems, were too big and expensive. (When you left your office you worked with second best. Or nothing at all.)

Enough of compromise.

The Pocket Rocket PA from NetComm changes all that. You get both fax and data transmission at 14,400 bps. And V.42bis gives you data throughput of up to 57,600 bps. (Many desktop modems don't even come close.) It even has MNP10 to improve performance over noisy telephone and cellular lines. Versions are available for IBM compatible and Macintosh PCs. And they're designed and manufactured here in Australia.

And as for size? Seeing is believing. The new Pocket Rocket PA is the smallest portable modem in the world. To put one in your pocket, call us now.



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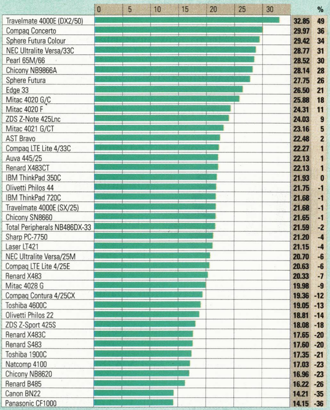
Words At Work NET 028

Benchtest results: Notebooks

DOSMARK



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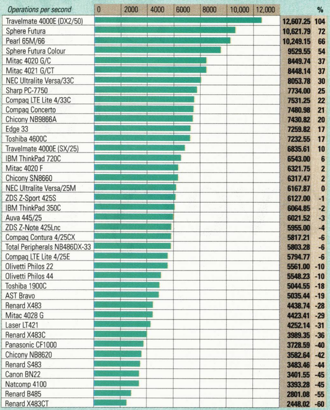
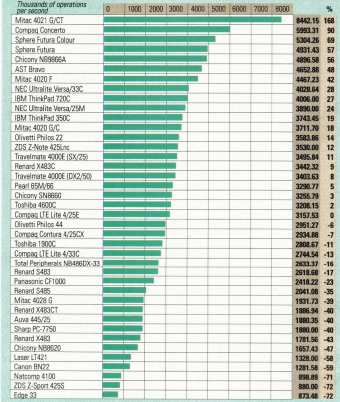
Travelmate 4000E (DX2/50)	32.85	49
Compaq Concerto	29.97	36
Sphere Futura Colour	29.42	34
NEC Ultralite Versa/33C	28.77	31
Pearl 65M/66	28.52	30
Chicony NB9866A	28.14	28
Sphere Futura	27.75	26
Edge 33	26.50	21
Mitac 4020 G/C	25.88	18
Mitac 4020 F	24.31	11
ZDS Z-Note 425Lnc	24.03	9
Mitac 4021 G/CT	23.16	5
AST Bravo	22.48	2
Compaq LTE Lite 4/33C	22.27	1
Auva 445/25	22.13	1
Renard X483CT	22.13	1
IBM ThinkPad 350C	21.93	0
Olivetti Philos 44	21.75	-1
IBM ThinkPad 720C	21.68	-1
Travelmate 4000E (SX/25)	21.68	-1
Chicony SN8660	21.65	-1
Total Peripherals NB486DX-33	21.59	-2
Sharp PC-7750	21.20	-4
Laser LT421	21.15	-4
NEC Ultralite Versa/25M	20.70	-6
Compaq LTE Lite 4/25E	20.63	-6
Renard X483	20.33	-7
Mitac 4028 G	19.98	-9
Compaq Contura 4/25CX	19.36	-12
Toshiba 4600C	19.05	-13
Olivetti Philos 22	18.81	-14
ZDS Z-Sport 425S	18.08	-18
Renard X483C	17.65	-20
Renard S483	17.60	-20
Toshiba 1900C	17.35	-21
Natcomp 4100	17.03	-23
Chicony NB8620	16.96	-23
Renard B485	16.22	-26
Canon BN22	14.21	-35
Panasonic CF1000	14.15	-36

PROCESSOR



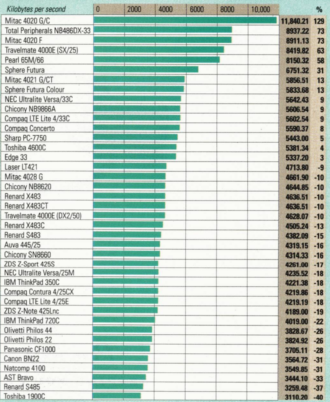
Operations per second		%
Travelmate 4000E (DX2/50)	12,607.25	104
Sphere Futura	10,621.79	72
Pearl 65M/66	10,249.15	66
Sphere Futura Colour	9529.55	54
Mitac 4020 G/C	8449.74	37
Mitac 4021 G/CT	8448.14	37
NEC Ultralite Versa/33C	8053.78	30
Sharp PC-7750	7734.00	25
Compaq LTE Lite 4/33C	7531.25	22
Compaq Concerto	7480.98	21
Chicony NB9866A	7430.82	20
Edge 33	7259.82	17
Toshiba 4600C	7232.55	17
Travelmate 4000E (SX/25)	6835.61	10
IBM ThinkPad 720C	6543.00	6
Mitac 4020 F	6321.75	2
Chicony SN8660	6317.47	2
NEC Ultralite Versa/25M	6167.87	0
ZDS Z-Sport 425S	6127.00	-1
IBM ThinkPad 350C	6064.85	-2
Auva 445/25	6021.52	-3
ZDS Z-Note 425Lnc	5955.00	-4
Compaq Contura 4/25CX	5817.21	-6
Total Peripherals NB486DX-33	5803.28	-6
Compaq LTE Lite 4/25E	5794.77	-6
Olivetti Philos 22	5561.00	-10
Olivetti Philos 44	5548.23	-10
Toshiba 1900C	5044.55	-18
AST Bravo	5035.44	-19
Renard X483	4438.74	-28
Mitac 4028 G	4423.41	-29
Laser LT421	4252.14	-31
Renard X483C	3989.35	-36
Panasonic CF1000	3728.59	-40
Chicony NB8620	3582.64	-42
Renard S483	3483.46	-44
Canon BN22	3401.55	-45
Natcomp 4100	3393.28	-45
Renard B485	2801.08	-55
Renard X483CT	2448.02	-60

VIDEO



Thousands of operations per second		%
Mitac 4021 G/CT	8442.15	168
Compaq Concerto	5993.31	90
Sphere Futura Colour	5304.26	69
Sphere Futura	4931.43	57
Chicony NB9866A	4896.58	56
AST Bravo	4652.88	48
Mitac 4020 F	4467.23	42
NEC Ultralite Versa/33C	4028.64	28
IBM ThinkPad 720C	4006.00	27
NEC Ultralite Versa/25M	3890.00	24
IBM ThinkPad 350C	3743.45	19
Mitac 4020 G/C	3711.70	18
Olivetti Philos 22	3583.86	14
ZDS Z-Note 425Lnc	3530.00	12
Travelmate 4000E (SX/25)	3495.84	11
Renard X483C	3442.32	9
Travelmate 4000E (DX2/50)	3403.63	8
Pearl 65M/66	3290.77	5
Chicony SN8660	3255.79	3
Toshiba 4600C	3208.15	2
Compaq LTE Lite 4/25E	3157.53	0
Olivetti Philos 44	2951.27	-6
Compaq Contura 4/25CX	2934.88	-7
Toshiba 1900C	2808.67	-11
Compaq LTE Lite 4/33C	2744.54	-13
Total Peripherals NB486DX-33	2633.37	-16
Renard S483	2618.68	-17
Panasonic CF1000	2418.22	-23
Renard S485	2041.08	-35
Mitac 4028 G	1931.73	-39
Renard X483CT	1886.94	-40
Auva 445/25	1880.35	-40
Sharp PC-7750	1880.00	-40
Renard X483	1781.56	-43
Chicony NB8620	1657.43	-47
Laser LT421	1328.00	-58
Canon BN22	1281.58	-59
Natcomp 4100	898.89	-71
ZDS Z-Sport 425S	880.00	-72
Edge 33	873.48	-72

MEMORY



Kilobytes per second		%
Mitac 4020 G/C	11,840.21	129
Total Peripherals NB486DX-33	8937.22	73
Mitac 4020 F	8911.13	73
Travelmate 4000E (SX/25)	8419.82	63
Pearl 65M/66	8150.32	58
Sphere Futura	6751.32	31
Mitac 4021 G/CT	5856.51	13
Sphere Futura Colour	5833.68	13
NEC Ultralite Versa/33C	5642.43	9
Chicony NB9866A	5606.54	9
Compaq LTE Lite 4/33C	5602.54	9
Compaq Concerto	5590.37	8
Sharp PC-7750	5443.00	5
Toshiba 4600C	5381.34	4
Edge 33	5337.20	3
Laser LT421	4713.80	-9
Mitac 4028 G	4661.90	-10
Chicony NB8620	4644.85	-10
Renard X483	4636.51	-10
Renard X483CT	4636.51	-10
Travelmate 4000E (DX2/50)	4628.07	-10
Renard X483C	4505.24	-13
Renard S483	4382.09	-15
Auva 445/25	4319.15	-16
Chicony SN8660	4314.33	-16
ZDS Z-Sport 425S	4261.00	-17
NEC Ultralite Versa/25M	4235.52	-18
IBM ThinkPad 350C	4221.38	-18
Compaq Contura 4/25CX	4219.86	-18
Compaq LTE Lite 4/25E	4219.19	-18
ZDS Z-Note 425Lnc	4189.00	-19
IBM ThinkPad 720C	4019.00	-22
Olivetti Philos 44	3828.67	-26
Olivetti Philos 22	3824.92	-26
Panasonic CF1000	3705.11	-28
Canon BN22	3564.72	-31
Natcomp 4100	3549.85	-31
AST Bravo	3444.10	-33
Renard S485	3259.48	-37
Toshiba 1900C	3110.20	-40

ZENITH DATA SYSTEMS

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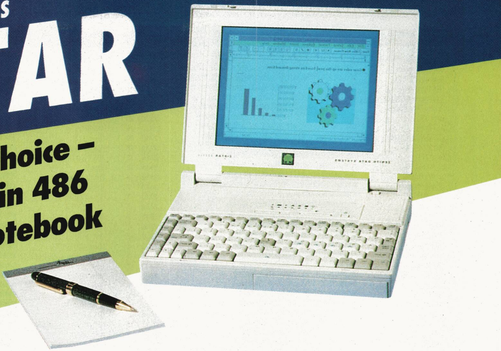

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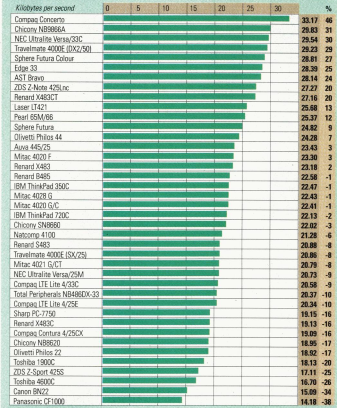
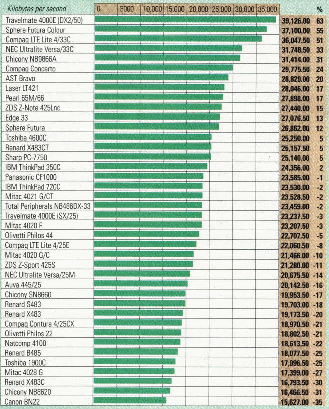
Benchtest results: Notebooks

DISK



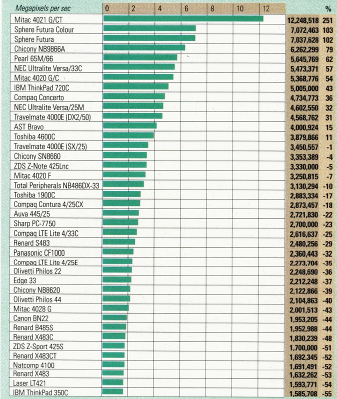
Kilobytes per second		%
Compaq Concerto	33.17	46
Chicony NB9866A	29.83	31
NEC Ultralite Versa/33C	29.54	30
Travelmate 4000E (DX2/50)	29.23	29
Sphere Futura Colour	28.81	27
Edge 33	28.39	25
AST Bravo	28.14	24
ZDS Z-Note 425Lnc	27.27	20
Renard X483CT	27.16	20
Laser LT421	25.68	13
Pearl 65M/66	25.37	12
Sphere Futura	24.82	9
Olivetti Philos 44	24.28	7
Auva 445/25	23.43	3
Mitac 4020 F	23.30	3
Renard X483	23.18	2
Renard B485	22.58	-1
IBM ThinkPad 350C	22.47	-1
Mitac 4028 G	22.43	-1
Mitac 4020 G/C	22.41	-1
IBM ThinkPad 720C	22.13	-2
Chicony SN8660	22.02	-3
Natcomp 4100	21.28	-6
Renard S483	20.88	-8
Travelmate 4000E (SX/25)	20.86	-8
Mitac 4021 G/CT	20.79	-8
NEC Ultralite Versa/25M	20.73	-9
Compaq LTE Lite 4/33C	20.58	-9
Total Peripherals NB486DX-33	20.37	-10
Compaq LTE Lite 4/25E	20.34	-10
Sharp PC-7750	19.15	-16
Renard X483C	19.13	-16
Compaq Contura 4/25CX	19.09	-16
Chicony NB8620	18.95	-17
Olivetti Philos 22	18.92	-17
Toshiba 1900C	18.13	-20
ZDS Z-Sport 425S	17.11	-25
Toshiba 4600C	16.70	-26
Canon BN22	15.09	-34
Panasonic CF1000	14.18	-38

DISK WINMARK



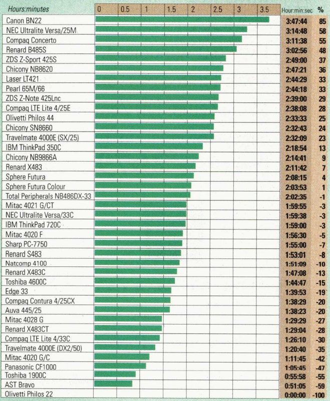
Kilobytes per second		%
Travelmate 4000E (DX2/50)	39,126.00	63
Sphere Futura Colour	37,100.00	55
Compaq LTE Lite 4/33C	36,047.50	51
NEC Ultralite Versa/33C	31,748.50	33
Chicony NB9866A	31,414.00	31
Compaq Concerto	29,775.50	24
AST Bravo	28,829.00	20
Laser LT421	28,046.00	17
Pearl 65M/66	27,898.00	17
ZDS Z-Note 425Lnc	27,440.00	15
Edge 33	27,076.50	13
Sphere Futura	26,862.00	12
Toshiba 4600C	25,250.00	5
Renard X483CT	25,157.50	5
Sharp PC-7750	25,140.00	5
IBM ThinkPad 350C	24,356.00	2
Panasonic CF1000	23,585.00	-1
IBM ThinkPad 720C	23,530.00	-2
Mitac 4021 G/CT	23,528.50	-2
Total Peripherals NB486DX-33	23,459.00	-2
Travelmate 4000E (SX/25)	23,237.50	-3
Mitac 4020 F	23,207.50	-3
Olivetti Philos 44	22,707.50	-5
Compaq LTE Lite 4/25E	22,060.50	-8
Mitac 4020 G/C	21,466.00	-10
ZDS Z-Sport 425S	21,280.00	-11
NEC Ultralite Versa/25M	20,675.50	-14
Auva 445/25	20,142.50	-16
Chicony SN8660	19,953.50	-17
Renard S483	19,703.00	-18
Renard X483	19,173.50	-20
Compaq Contura 4/25CX	18,970.50	-21
Olivetti Philos 22	18,802.50	-21
Natcomp 4100	18,613.50	-22
Renard B485	18,077.50	-25
Toshiba 1900C	17,996.50	-25
Mitac 4028 G	17,399.00	-27
Renard X483C	16,793.50	-30
Chicony NB8620	16,466.50	-31
Canon BN22	15,627.00	-35

GRAPHICS WINMARK



Megapixels per sec		%
Mitac 4021 G/CT	12,248,518	251
Sphere Futura Colour	7,072,463	103
Sphere Futura	7,037,628	102
Chicony NB9866A	6,262,299	79
Pearl 65M/66	5,645,769	62
NEC Ultralite Versa/33C	5,473,371	57
Mitac 4020 G/C	5,368,776	54
IBM ThinkPad 720C	5,005,000	43
Compaq Concerto	4,734,773	36
NEC Ultralite Versa/25M	4,602,550	32
Travelmate 4000E (DX2/50)	4,568,762	31
AST Bravo	4,000,924	15
Toshiba 4600C	3,879,866	11
Travelmate 4000E (SX/25)	3,450,557	-1
Chicony SN8660	3,353,389	-4
ZDS Z-Note 425Lnc	3,330,000	-5
Mitac 4020 F	3,250,815	-7
Total Peripherals NB486DX-33	3,130,294	-10
Toshiba 1900C	2,883,334	-17
Compaq Contura 4/25CX	2,873,457	-18
Auva 445/25	2,721,830	-22
Sharp PC-7750	2,700,000	-23
Compaq LTE Lite 4/33C	2,616,637	-25
Renard S483	2,480,256	-29
Panasonic CF1000	2,360,443	-32
Compaq LTE Lite 4/25E	2,273,704	-35
Olivetti Philos 22	2,248,690	-36
Edge 33	2,212,248	-37
Chicony NB8620	2,122,866	-39
Olivetti Philos 44	2,104,863	-40
Mitac 4028 G	2,001,513	-43
Canon BN22	1,953,205	-44
Renard B485S	1,952,988	-44
Renard X483C	1,830,239	-48
ZDS Z-Sport 425S	1,700,000	-51
Renard X483CT	1,692,345	-52
Natcomp 4100	1,691,491	-52
Renard X483	1,632,262	-53
Laser LT421	1,593,771	-54
IBM ThinkPad 350C	1,585,708	-55

BATTERY LIFE



Hours:minutes	Hour:min:sec	%
Canon BN22	3:47:44	85
NEC Ultralite Versa/25M	3:14:48	58
Compaq Concerto	3:11:38	55
Renard B485S	3:02:56	48
ZDS Z-Sport 425S	2:49:00	37
Chicony NB8620	2:47:21	36
Laser LT421	2:44:29	33
Pearl 65M/66	2:44:18	33
ZDS Z-Note 425Lnc	2:39:00	29
Compaq LTE Lite 4/25E	2:38:08	28
Olivetti Philos 44	2:33:33	25
Chicony SN8660	2:32:43	24
Travelmate 4000E (SX/25)	2:32:09	23
IBM ThinkPad 350C	2:18:54	13
Chicony NB9866A	2:14:41	9
Renard X483	2:11:42	7
Sphere Futura	2:08:15	4
Sphere Futura Colour	2:03:53	1
Total Peripherals NB486DX-33	2:02:35	-1
Mitac 4021 G/CT	1:59:55	-3
NEC Ultralite Versa/33C	1:59:38	-3
IBM ThinkPad 720C	1:59:00	-3
Mitac 4020 F	1:56:30	-5
Sharp PC-7750	1:55:00	-7
Renard S483	1:53:01	-8
Natcomp 4100	1:51:09	-10
Renard X483C	1:47:08	-13
Toshiba 4600C	1:44:47	-15
Edge 33	1:39:53	-19
Compaq Contura 4/25CX	1:38:29	-20
Auva 445/25	1:38:23	-20
Mitac 4028 G	1:29:29	-27
Renard X483CT	1:29:04	-28
Compaq LTE Lite 4/33C	1:26:10	-30
Travelmate 4000E (DX2/50)	1:20:40	-35
Mitac 4020 G/C	1:11:45	-42
Panasonic CF1000	1:05:45	-47
Toshiba 1900C	0:55:58	-55
AST Bravo	0:51:05	-59
Olivetti Philos 22	0:00:00	-100

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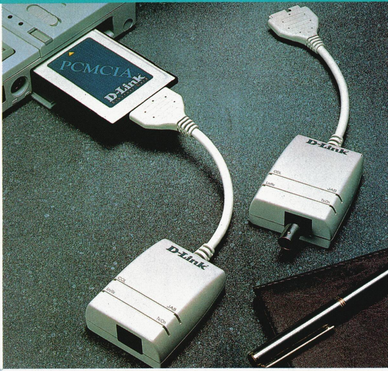

The DE-650 is a credit card size Ethernet adapter that plugs into the PCMCIA slot, now a standard feature of many notebooks. Switchless and automatic configuration makes this a hassle-free installation. Two media couplers are available, BNC and UTP which may be interchanged with the same base unit. The unit supports all major networking software including IBM PC LAN v1.31, OS/2 LAN Server v2.0, Novell NetWare v3.x, Lite, LAN Manager v2.1, DEC PathWorks v4.0, SCO Unix/Xenix, FTP TCP/IP, NetBIOS, D-Link's LANsmart and TCP/IP.

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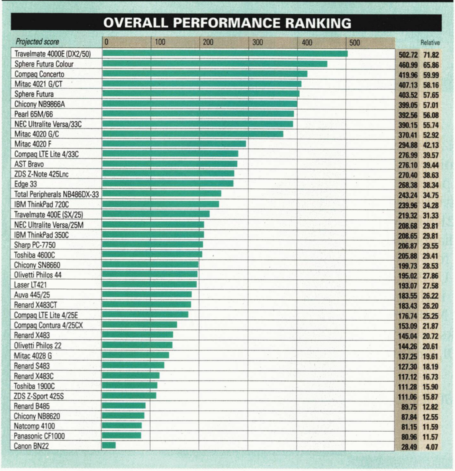
Benchtest results: Notebooks



'bang for buck' comparisons help to provide objective weight to the review process, the value of notebook computers — more than any other genre of hardware — relies on its suitability to the user and the user's tasks.

When choosing a notebook, above all try before you buy. Try to organise with the seller to road-test the notebook, as you would a car. Even the smallest faults on a notebook can be critical, as it's near-impossible to have imperfect, especially subjectively imperfect faults corrected, and you'll be lumbered with them for all your working hours.

If you're not 100 per cent sure you need active matrix colour, don't go anywhere near an active matrix unit. Once you have, you'll be hooked and anything else will be intolerable. While Windows is more pleasant with lots of pretty colours, and there are practical benefits to colour, the colour costs. It's for you to determine whether you'd rather have colour onscreen or extra performance and features.

It's very easy when reviewing to forget the price ticket. There are many people who are prepared to pay for the quality on offer at any price, even $8000 or $10,000, but we suspect not a majority. There are some good-looking offerings from lesser known vendors at around $3000, but in notebooks, your working life is riding in the carry bag, and quality becomes critical, and there are reliable machines available from well-known vendors for prices starting around $3800 to $4500.

Whether name and reputation are worth the extra thousand is a choice that's up to the purchaser. While not derogating the lesser known brands, they are just that, lesser known. We think there are times when it's worth paying for a known quantity. As we've said though, notebook computing is about compromise, and quality is one more variable in the weight/performance/features equation.

AST Bravo NB 4/25s ColourPlus

AST PowerExec Series

By Helen Dancer

AST recorded $944.1 million revenue in fiscal 1992, a rise of 37 per cent over the previous year, and a continuation in AST's decade-long growth pattern. This year saw the company's acquisition of the Tandy Corp's PC manufacturing operations, a move which has put the future development and marketing of the PDA contender Zoomer in AST's hands. Portable computing has assumed strategic emphasis for AST, as part of a general expansion model.

The notebook AST presented for review in this feature was a Bravo NB 4/25s ColourPlus. The notebook features an active colour matrix screen, 4M RAM and a 170M hard disk. Communications and other expansion capabilities are facilitated by the provision of a PCMCIA Type III slot. It offers one serial, one parallel and one mouse port, and has an integrated trackball situated on the lower right-hand side of the keyboard.

The beautiful screen on this AST Bravo ColourPlus was ogled by all the technophiles in the *APC* testing labs before it was snaffled away by your faithful scribe. The active matrix colour means that the screen is still readable at an angle of nearly 180 degrees, and that the quality of the display is much better front-on than its passive colour sibling.

This is my second view of the Bravo (see First Looks October 1993 *APC*), and my bias is unchanged. It is a fine little notebook; light and compact, with no compromise on the size of the keyboard. Personal preference aside, it also scored well in the *APC* benchmarks, particularly in the areas of disk performance, WinDisk response and video quality. Less satisfactory results were recorded for battery performance and Windows graphics, with this notebook ranking in the middle of the field for processor performance.

The Bravo's performance against those models in its own class was exceptionally good. The only machines that scored significantly and consistently better overall were much higher-capacity machines, such as the TI TravelMate.

For the DOSMark, the Bravo ranked 13th

The $7200 AST Bravo NB 4/25s ColourPlus is a 25MHz 486SL-based notebook with a 170M hard disk. Best feature: exceptional performance in its class

AT A GLANCE

AST Bravo NB 4/25s ColourPlus

Distributor AST Research
Telephone: (02) 415 5400
Price: $7200
Specifications: Intel 25MHz 486/SL, 4M of Standard RAM, expandable to 20M, 170M standard hard disk, PCMCIA Type III, active matrix colour screen

among our survey sample, with a score of 22.48. This good score was despite a poor Processor harmonic of 5035 and abysmal Memory harmonic of 3444, the third worst.

The areas where the Bravo shines are in Disk and Video performance under DOS. DOS Video was an astounding 48 per cent above average, sixth in our series with a score of 4652. The local bus video continued to shine under Windows, registering a Graphic WinMark score of just over four megapixels per second, the 12 best score and 15 per cent above average.

Likewise, the Bravo's DOS Disk score of 28.14 was 24 per cent above average, and ranked seventh. The excellent hard drive performance was carried over under Windows, the Bravo again ranking seventh with a score of 28829.

For our relative performance comparisons, this combination of results placed the Bravo an excellent 12th overall, just behind the Compaq 4/33C, and easily better than any other 25MHz-based unit.

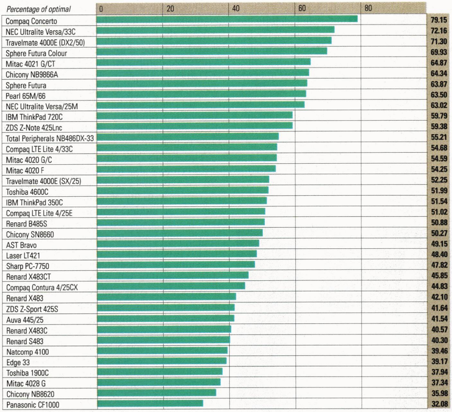
The real let-down with the Bravo, though, was battery life. While it has a full complement of power management features, short of hibernation — or saving RAM contents to disk before power-down for later instant recall — the raw battery life in our rundown tests was just 51 minutes, a result nearly 59 per cent below average. This is, I guess, the price paid for high-end disk and video performance, and with an active matrix screen you'd expect longer-life battery juice.

Considering that its performance was closer to what you'd expect from a 33MHz machine, the full active matrix colour version of the Bravo carries a competitive price tag at $7200. Sacrificing this glorious screen has its cost benefits, however. The monochrome version retails for just $3990, a price at which it competes very favourably with Compaq's LTE 4/25, TI's TravelMate 4000E SX/25, and NEC's Versa/25M at $4871. The passive matrix colour models start from $5814.

It's a question of requirement versus pricepoint, a function of the diversifying market that AST has taken very much to heart in its notebook strategy.

RELATIVE BANG

Performance, features & portability



The Bravo notebooks form the entry-level range in the AST portable computing strategy. The Bravo NB 4/25s is a 25MHz 486SL notebook with standard 170M hard drive. AST has traded upgradability for affordability with the Bravo range, although the RAM is, of course, extendable from the standard 4M to 20M.

AST PowerExec

For the more experienced, more feature-hungry user, AST offers the PowerExec range, in 386/25, 486/25 and 486/33 configuration options. Priced higher than the Bravo range, and competing directly with the NEC Versa range of notebooks in feature set and price, the PowerExec line offers the full upgradability for which AST has become renowned.

While AST's latest 33MHz 486 PowerExec was not available in time for this review, it should be a real performer, based — like the Versa/33c and Compaq 4/33C — on the Intel 486SL low-consumption chipset. The current 4/25SL Colour PowerExec has a DOSMark of 23.97, a Graphic WinMark of 3.41 megapixels per second, and Disk WinMark of 26.74, placing it interestingly behind the Bravo in performance if not necessarily specifications and upgrade potential.

The PowerExec 4/25 mono is priced at $5791.20 and the PowerExec 4/25 with active matrix 8.5in colour display sells for $8869.20.

The 4/25s Bravo ColourPlus is pitched against the Compaq Contura 4/25CX and the IBM ThinkPad 720C; the mono and passive colour models also have their Compaq and IBM equivalents. The AST models score consistently better in feature set in the areas of display quality, weight and size, and offer three year, return-to-base warranty, which is attractive to customers looking for a notebook at an entry-level pricepoint. The assumption is that these people are buying their first notebook, and that the added security of long warranty periods will appeal.

Auva 445/25

By David Lin

This $2850 monochrome 486SX/25 notebook came to us with 4M of RAM, 120M hard disk, a carry bag and PC-DOS 6.1. A smart-looking cream coloured machine, it has a single hinge to its screen which is detachable, a single 3.5in floppy drive mounted on the right-hand side, a docking station port on the left, plus parallel, serial and VGA port at rear, and an on/off power switch mounted at the side. The battery is removable too. Display controls are situated in a corner of the screen.

Other features of this model include the Phoenix BIOS' power management facility and hard disk shutdown. Options available to expand the 445/25's capabilities are a docking station, proprietary 4M RAM cards boosting memory to 8M, and a 5.25in floppy drive that plugs into the parallel port. Try as I might, though, I could not locate any external keyboard socket despite the manual's advice. There are some DIP switches located on the underside which determine some of the operating parameters, such as using the onboard display circuitry or configuring the parallel port for floppy drive or printer use.

The Auva 445/25 is based on Intel's 25MHz 486SX processor. Best feature: solid offering for less than $3000

The Auva 445/25 also has some ingenious 'cut-outs' for internal devices. One at the front left is for a scanner, and another diagonally opposite at the rear right is for a fax/modem. There is a choice of two types of fax — both modems are 2400 baud but the fax capabilities differ. One is 4800 baud send-only and the other is full 9600 send and 4800 receive. The scanner is a 400dpi 'black-and-white' card, as per the manual, which we assume to mean greyscale.

In performance, the 445/25 was in the average band across all of the criteria measured. The DOSMark score of 22.13 hid some deficiencies in the video area from the Cirrus Logic chipset; the Graphics WinMark was not assisted either, as no video drivers were shipped.

AT A GLANCE

Auva 445/25

Distributor:	Auva Computers Australia
Telephone:	(02) 899 7176
Price:	$2850
Specifications:	25MHz Intel 486/SX CPU, 4M of standard RAM, expandable to 8M, 120M hard disk, greyscale LCD display.

This notebook's screen appears rather average as well. If anything, 1993 has determined that vibrant 256 colour is a mainstream line of thought for users buying a portable computer; the Auva's greyscale LCD, though ample in display area, was just adequate for working with when tilted just beyond perpendicular. With this machine, there was a tendency for tell-tale bands in the display and the backlighting could have been better.

The Auva's disk rated well in our tests, and it is removable too — a big plus. A hard disk of 120M on a portable is generous; to have the capability of maintaining an extra drive is an added bonus. Changing the screen was also easy, as was the NiCad battery pack. A major disappointment was the proprietary memory upgrade solution. Discount any possibilities of power portable computing when the maximum onboard RAM is only 8M! Battery power ran down in 1 hour, 38 minutes, which was down on the norm, so don't expect to do too much computing on the road.

For a price under $3000 you would not expect to get a state-of-the-art machine. You do expect tried and true technology, and this is the case with the Auva 445/25. This machine's 486SX processor commends itself to many prospective purchasers and the optional extras at face value are attractive, but be prepared for a rough ride if GUI is your bent as there are no video drivers or a pointing device included in this package.

Canon BN22

By Ben Gerholt

Canon's $6995 BN22 is a combination of bubblejet printer and low-performance 486SLC/25-based notebook. It allows on-the-go working right up to the finished document stage, and with a PCMCIA or portable fax modem installed, opens up great possibilities as a total communications/mobile office solution.

At 4kg, this machine is heavier, and also a fraction larger in all dimensions, than most notebooks. Using the keyboard, at first, is made a little uncomfortable by the paper feed, located beneath the keyboard, increasing the thickness of the unit. After a short period of time, new users will become accustomed to this posture and will find it possible to use the front 'bar' of the machine as a wrist rest.

Video is displayed on a Sharp backlit LCD screen that provides a very crisp 16 greys, while brightness and contrast slide controls allow accurate screen adjustments. Unfortunately for users wishing to make screen presentations, the unit does not allow simultaneous display on the LCD screen and an external monitor.

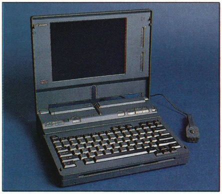
Instead of a ballpoint mouse or internal trackball, the unit comes with a lollipop pointing device that includes trackball and microswitch buttons. This device is held in the palm of the hand, the thumb operating the ball and the index finger controlling the buttons. It can be used effectively with either hand and permits accurate pointing . . . but not so accurate drawing. It is as good as an internal or external fixed trackball, and for portable use it is far better than a mouse that relies on flat clean surfaces.

AT A GLANCE

Canon BN22

Distributor:	Canon
Telephone:	(02) 805 2000
Price:	$6995
Specifications:	Cyrix 25MHz 486SLC/25 CPU, 4M of standard RAM, upgradable to 12M, 85M hard disk, two Type II PCMCIA slots, backlit LCD display.

The inkjet capability of this Canon notebook is subliminally suggested in the design of the unit. The entire case is the deepest charcoal colour with a status display panel that looks, for all the world, like an inkwell. The print setup can deliver a resolution of 360 by 360dpi, a print speed of 116 characters per second and a cartridge life of 100,000 characters. A second cartridge is provided with the unit. The print pathway is flat — in at the front underneath the keyboard, through past the print head and out the back. The paper pathway can take widths up to, and a fraction over, A4 size. Slight variances in width can be accounted for by raising the key-



The Canon BN22 notebook builds in an inkjet printer. Best features: its versatility and approach to the complete portable office

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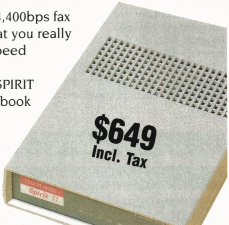

Spirit Pocket fax modem

Speeds: 14,400bps V.32bis 9,600bps V.32, 300-9,600bps TX/RX Speeds
Error correction: MNP 2, 3, 4, V.42
Compression: MNP 5, V.42bis
Facsimile: 9,600bps, G3, Class 2 send & receive
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Spirit II fax modem

Speeds: 14,400bps V.32bis 9,600bps V.32, 1,200-9,600bps TX/RX Speeds
Error correction: MNP 2, 3, 4, V.42
Compression: MNP 5, V.42bis
Facsimile: 14,400bps, G3, Class 1 send & receive
Extras: Fax & comms software

board and adjusting the slide on the 10-page sheet feeder. Feeding is easy, as is the overall operation of the printer.

The BN22's performance is far from spectacular. It uses the 25MHz Cyrix 486SLC chip that processes at 16-bit internally. The machine's DOSMark (14.21) was the second lowest of the test group; 35 per cent below average. This extremely poor score is derived from Processor, Memory, Video and Disk harmonics that are all over 30 per cent below average. In particular, the Video harmonic was 1281.58 or 59 per cent below the average result. The poor Graphic WinMark (1.95 megapixels per second) and Disk WinMark (15627) mirror these results. Results such as these are inherent with the SLC processor that comes without external processor cache.

On the other hand, the BN22's battery lasted three hours and 47 minutes in the rundown tests — the best result of the test group and due in part to the low consumption of the SLC chip. Base models come with 4M of RAM that can be user-expanded to 12M. It should be noted that this test did not include any printing, which obviously will significantly reduce battery life.

There are two Type II (Version 2.0) PCMCIA slots that are arranged in piggy-back fashion, which allows the insertion of one Type II card. Canon currently does not sell the unit with any PCMCIA cards as options, but can recommend third-party cards. An 85M hard disk came on the tested unit (180M is optional), but it is not removable. The unit's powerpack is not small, but it is comparatively light.

While the lack of performance in this machine can be lived with, it is not the sort of result that should be expected of a $6995 machine. Bringing the drive size up to a more respectable 180M is also a very costly decision, with the upgraded unit's price a numbing $8495; $1500 for 100M of disk space. However, if you like the idea of the completely portable office in one unit, then this versatile machine could be the perfect choice.

Chicony SN8660

Chicony NB8620

Chicony NB9866A

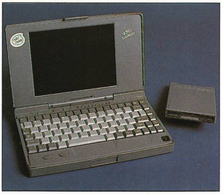
By Ben Gerholt

Teco Australia's Chicony series provides good performance at excellent prices. The company's 486DX2/66 comes with an active matrix screen for under $8000 and its $3236 subnote weighs less than 2kg, has a PCMCIA slot and has better than average performance. The machines provide bargain hunters with an alternative to the name brands. Teco Australia offers a 12-month return to base warranty and charges only $75 for the first year onsite.

Chicony SN8660

The $3236 Chicony SN8660 is a very light Intel 486SX25-based subnotebook that comes with an 86-key keyboard, backlit LCD screen, inbuilt trackball and an 80M hard disk.

At 28 by 17 by 3.7cm, the machine is wide enough to allow a full keyboard, but in all other respects is far smaller than the average notebook. It is also an ideal portable, weighing only 1.8kg. These compact dimensions do not, however, impede on either the use of the machine or the performance.



Chicony's subnotebook, the SN8660, weighs 1.8kg. Best feature: its performance in benchtests — a good result for a machine in this class

The keyboard is comfortable to use; there is a large wrist rest at the front of the unit that includes a very small trackball and trackball keys. This trackball unit, aside from being a little on the small side, does not affect the keyboard. The status display includes LEDs to draw attention to processor operation level and low battery charge.

The unit comes with one PCMCIA slot, the hard drive is removable, and there is a full expansion port at the rear as well as serial, parallel, video and an external keyboard/numeric keypad port. On the side of the unit, next to the PCMCIA slot, is a floppy disk drive port to attach the external 3.5in drive that comes with the machine. This external drive is extremely thin and light — it could be easily taken along with the unit on the road, if needed. The hard disk drive can be easily removed from underneath for security storage or replacement. There is also a removable cover that opens to reveal the processor and allow extra memory — up to 12M can be added using 8M expansion cards — to be placed by the user. There is a PS/2 keyboard convertor cable for the proprietary plug that transfers it to an ordinary plug, plus a 9-to-25pin convertor cable for serial port.

The subnotebook performed credibly in benchmark tests. The majority of results were at an average level of performance for a test group that included a number of 33 to 66MHz 486 machines. The DOSMark of 21.65 was only one per cent below the average result. The unit came 19th in the Video harmonic with a score of 3255.79, while its Graphic WinMark was 3.35 megapixels per second — the 14th best result of the test group. Disk performance was not as good as this machine's graphics capability, with a Disk harmonic of 22.02 (three per cent below average) and a Disk WinMark of 19953 (17 per cent below average). These results point to a good all-round performer with excellent Windows capabilities.

Options that can be purchased with the subnotebook include a docking station, memory expansion card, 17-key numeric keypad, car adaptor, additional NiCad battery and charger.

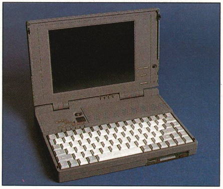
This is a good machine in the subnote category. It combines performance with portability and at $3236 is priced well within reach.

Chicony NB8620

The $2860 Chicony NB8620 is a very basic model. Its performance, based on the Cyrix 486SLC/33 and is far down the scale of the majority of notebooks in the test group.

The machine comes with both contrast and brightness controls, and a Sanyo backlit LCD screen that provides good video up to 64 shades of grey. The trackball on the unit is more annoying than useful; it is very small and located on the far side of the keyboard towards the centre of the unit on the left side. The location of the trackball buttons is ridiculous, and they are so small that even a two-year-old's fingers would be cramped.

The whole unit is made of non-slip plas-



The Chicony NB8620 entry-level notebook. Its best feature is its low price tag tic. Using the keyboard — also made of this material — is almost like scraping your fingernails down a blackboard, not something you need at any time of the day.

Parallel, two serial and external keyboard ports are located on the left side of the unit — annoying to connect a printer cable to. At the rear there is an expansion and an external video port; an optional docking station can be connected to this expansion port. There is, however, no PCMCIA slot, and the unit can only be expanded to 8M of RAM (4M standard).

The performance of the NB8620 was consistently in the lower half of the tested group. Its 16.96 DOSMark score was extremely poor mainly due to poor Disk harmonic (18.95, 17 per cent below average). The video and processor scores were over 40 per cent below average, and the Disk WinMark (16466) was ranked 38 out of 39 units. The Graphic WinMark in the light of these scores was quite good even though at 2.12 megapixels per second, it was 31 per cent below average.

There are few other interesting features of this very basic unit. It comes standard with a 120M hard drive, a 3.5in floppy drive and 4M RAM. At only $2860, this unit is a good compromise for those who can sacrifice performance for price.

Chicony NB9866A

The $7848 Chicony NB9866A notebook is designed around Intel's 486DX2/66 processor. It is the top-of-the-line unit from Teco Australia that combines high performance with a Sharp active-matrix display.

Perhaps the first thing you notice about this unit when you switch on the power is that it is as noisy as most desktop units. The powerful 486DX2/66 processor produces a fair amount of heat, and to keep the temperature down an inbuilt fan has been installed. The base of the unit, even with the fan, still manages to become quite warm even in cool weather.

For getting around the screen, this unit provides an inbuilt trackball that we found to be poorly positioned on the far side of the keyboard; the operating hand must be held in mid-air to avoid resting on keys. The ball itself, however, is a good size and is quite responsive.

A 200M drive came with the tested unit that gave an excellent Disk harmonic of 29.83 and Disk WinMark of 31414, excellent results and both 31 per cent above the test group average. The proprietary motherboard with an OPTI chipset and 4M of RAM as standard gave a DOSMark score of 28.14 (28 per cent above average). The NB9866A also gave excellent results in the WinMark tests. The Graphics WinMark was 6.26 megapixels per second, 84 per cent above the average result.

AT A GLANCE

Chicony SN8660

Distributor: Teco Australia
Telephone: (02) 725 1233
Price: $3236
Specifications: Intel 25MHz 486SX CPU, 4M of standard RAM, expandable to 16M, 80M hard disk, PCMCIA slot, backlit monochrome LCD screen

Chicony NB8620

Distributor: Teco Australia
Telephone: (02) 725 1233
Price $2860
Specifications: Cyrix 486SLC/33 CPU, 4M of standard RAM, expandable to 8M, 120M hard disk, backlit monochrome LCD screen

Chicony NB9866A

Distributor: Teco Australia
Telephone: (02) 725 1233
Price: $7848
Specifications: 66MHz Intel 486DX2 CPU, 4M of standard RAM upgradable to 16M, 200M hard disk, PCMCIA slots, active matrix colour display

The unit comes with a power pack, carry bag and PS/2 keyboard adaptor. There is a Type III PCMCIA expansion slot (two Type II slots), plus serial, parallel, SVGA and docking station ports for expansion. On the right-hand side of the unit is a 3.5in floppy drive that comes with a side eject button; fingers don't get in the way.

The 86-key keyboard includes an inverted T cursor keys, page control keys and a full 12-function keys. The board is comfortable thanks to the wrist rest panel that is over the top of the battery. The keys are a little 'clicky', but are easy to get used to and after a while give a reassuring feeling — once a key is pressed the result is apparent; there are no missed keystrokes.

The 66MHz 486DX6-based Chicony NB9866A includes an inbuilt fan to keep the heat down during operation. Best feature: its performance figures

The unit comes with a power-on self test (POST). The test checks processor, keyboard, display screen and driver, system memory and most of the options installed. On the rundown test, the battery lasted over two hours; a fantastic result considering the screen, processor and internal fan.

A sturdy unit, the Chicony NB9866A performs very well and ranked sixth in our overall performance scores.

Compaq LTE Lite Series

Compaq Contura 4/25CX

Compaq Concerto

By Stuart Bowman and Ben Gerholt

Compaq and quality are synonymous when it comes to laptops and notebooks. The company submitted four machines for review, ranging from the new Concerto pen-based notebook to the Compaq Contura, which is rapidly gaining popularity, and moving in on the established Compaq LTE Lite 4/25E and 4/33C market.

The Lites

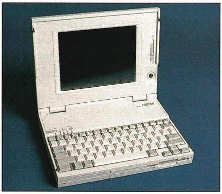
While the Compaq LTE Lite 4/33C was one of the most expensive machines reviewed at $9852 for a unit with 4M of RAM, it is also one of the most feature packed. Its 21.3cm active-matrix colour screen can only be described as dramatic; the colours are crisp, bright and well defined, rivalling that of many desk-based monitors. It is capable of an internal resolution of 600 by 480 running 256 colours, simultaneous VGA display, and an external resolution of 800 by 600 at 256 colours. We reviewed a machine with 8M of RAM, which takes the price tag to $10,656.

The processor used is the new low-voltage 486SL chip from Intel running at 33MHz. This resulted in a Processor harmonic of 7531, which was 22 per cent above the average, and a Memory harmonic of 5602. Unfortunately, the DOSMark of 22.27 was pegged back by a slower video and disk subsystem. As a result of disk caching, the Windows disk performance was considerably better, with a DiskMark of 36047.5 or 51 per cent above average. The Windows graphics rate of 2.61 megapixels per second was 25 per cent below the average.

On our PC Labs battery rundown test, the NiMh battery lasted for one hour, 26 minutes.

The main differences between the LTE Lite 4/33C and the LTE Lite 4/25E, apart from price, are processor speeds and the mono active-matrix display of the 4/25E. At $4579, the 4/25E is considerably cheaper than the LTE Lite 4/33C.

The 4/25E also uses Intel's low voltage 486SL chip, but runs at a slower 25MHz. Performance here is solid, with Processor harmonics of 5749, which is six per cent below the average, while the Disk harmonic of 20.34 is similar to the 4/33C. The 4/25E uses a faster video subsystem that produces a DOS graphic of 3158, which is slightly above average. This produces a solid DOSMark of 20.63.



The main difference between the Compaq LTE Lite 4/33C and 4/25E are processor and screen type. Best feature of the 4/25E is its active-matrix monochrome screen

The most notable feature of the 4/25E is its active-matrix monochrome screen. It was the best monochrome screen that we have seen — at 24.1cm, it is larger than the 4/33C, but has none of the ghosting or washout traditionally associated with monochrome displays, and is visible from most angles and under any lighting condition.

This machine offers plenty: a breakthrough in monochrome screens, retaining the quality associated with Compaq, and a price tag that competes well with the growing number of cheap clone machines.

With a monochrome screen and slower processor, the 4/25E lasted a lot longer on its battery rundown test — two hours and 38 minutes, or 30 per cent above the average.

The physical attributes of these two machines are identical: weighing in at 3kg, they are both portable and expandable. While they do have an external desktop expansion bus and SCSI port option, they lack any PCMCIA slots. Despite this there is room enough for an internal modem. With the desktop expansion chassis they can be used to fully replace a desktop machine.

The Contura 4/25CX

The Contura is a sensible compromise between price and performance. While the Contura machines don't have the same expansion capabilities as the LTE Lite series, they do have the same high-end features and ease of use.

The Contura 4/25CX features a bright active matrix colour display. It excels for its high-end, user-friendly features

The charcoal grey case is strong and rugged, and at 22.6 by 29.7 by 5.3cm, it is slightly larger than the Lites, but of the same weight.

The Contura 4/25CX we looked at had 8M of RAM (taking the price to $7445) and did well in our benchtests. At 5817 and 2935, the Processor and Memory harmonics are nearly identical to the Lite 4/25E. A slower 120M disk drive resulted in both DOS and Windows disk results being 20 per cent below average at 19.09 and 1890.5. For a colour screen, the Graphics WinMark comes in at 2.87 megapixels per second, which was faster than both the Lites tested. The overall DOSMark score was 19.36.

The screen is a 21.3cm active matrix colour, which is bright and colourful. The price tag of $6872 (with 4M) makes it one of the cheapest quality notebooks available. There are two other notebooks in the Contura range, which are identical except for the screen type and internal trackball — the Contura 4/25C and 4/25.

The Contura 4/25C boosts a dual-scan passive matrix screen. For a passive matrix screen, it is exceptional and could easily be mistaken for active matrix. The Contura 4/25 has a monochrome screen. The battery rundown on the Contura 4/25CX and 4/25C are similar at one hour 42 minutes, while the Contura 4/25 will last for two hours, 28 minutes on battery rundown.

Compaq notebooks and laptops are known for their high-end user-friendly features. Most of the functions on these machines can be easily accessed by Fn hotkey combinations. There are three levels of power management and excellent display of current battery status. On the Lites, battery reserves are given in hours and minutes, while on the Contura line it is represented graphically. These machines can be sent into hibernation indefinitely as the contents of the RAM is written to the hard drive before the machine shuts down. Excellent screen-mounted trackballs are fitted on all the Lites and the Contura 4/25CX.

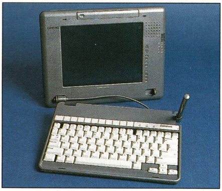
Compaq offers extremely rugged cases for its notebooks. Rather than the usual slouchy leather travel-bag style that is offered by most vendors, Compaq gives users two styles of cases — a small handheld case just large enough to hold only the notebook, and a large A3 size case, which is fully reinforced, and comes with plenty of pockets, organiser dividers and padding. The latter is easily the best choice for a notebook carrycase on the market for peace of mind, although with two notebooks inside — which it can hold — it gets might heavy.

It does not take long using these machines to realise the effects of Compaq's inhouse optimisation and quality control. And with a three-year international warranty and toll free tech support number, you also have peace of mind.

Compaq Concerto

Compaq provided us with a pre-production model of its new Concerto, a pen-based notebook with tablet capabilities, for this review. Initially reviewed in October *APC*'s First Looks section, this unit bridges the gap between a pen-based tablet and the run-of-the-mill, but currently more useful, notebook.

The design of the unit is unique, as might be expected from such a versatile machine. The Concerto can be used in a number of nodes: as a tablet-only unit, an ordinary clamshell notebook or as a demonstration machine with the keyboard detached from the case but still plugged in.



The hybrid Compaq Concerto — a notebook and Pen PC in on package. Best features: adapability, performance and price

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ADVANCED PORTABLE TECHNOLOGIES
"The Total Portable Solutions Company"

Hewlett-Packard's OmniBook

BY JEREMY WHITE

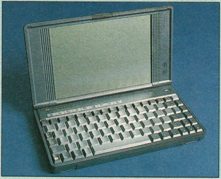
Hewlett-Packard is making a unique and very serious assault on the mobile computing market. Rather than producing standard units with more features, more power and more gimmicks, the company has produced two 'PCs' (and they meet most reasonable definitions) aimed at providing feasible under-the-arm or in-the-pocket computing. The $4807 OmniBook is a 386-Windows computer, co-developed with Microsoft and featuring Excel, Word and other software not only preloaded, but preloaded in ROM. The $1454 HP100XL is a palmtop, fully DOS compatible PC with Lotus 1-2-3, cc:Mail and diary/contact programs preloaded. Both are modest in their performance aims, and worth boasting about for their portability. They have their faults, some serious, but are two of those really innovative products that only pop-up in human endeavour once in awhile.

The OmniBook

Hewlett-Packard has a winner with the OmniBook. Nearly all of the notebooks we examine here, even the subnotebooks, share a basic design philosophy, and that is to fit the maximum computing power possible in the most portable form. The move towards active matrix colour displays, and the popularity of the kind of performance provided by TI or NEC or the 66MHz clones, clearly indicate that notebook computers are aimed at those who don't want their computing power compromised. These are machines for people who want a desktop computer they can move around easily and use sitting at different desks. None of them are open-anywhere use-anytime PCs. Except the OmniBook.

The OmniBook doesn't even rate for performance, and it would not have been fair or appropriate to include it in our comparison charts. It was a nightmare trying to convince a unit with its completely non-standard configuration to undertake benchmarking, and its entire architecture and 386/20 performance guaranteed that it would be a dud by any traditional benchmark methods. If you want a 486 screamer, look elsewhere.

If you are looking for a computer you really can use anywhere, though, this is the one. I worked on part of this review sitting in an airport terminal and then on a plane. Nothing unique about that. Did a bit of work in the office, and some at home. Nothing strange there either. But then I sat working with the OmniBook on my knee on the back steps at home, then sitting in the passenger seat of a car, and later in front of the TV, and then in bed. All this on one battery charge, sporadically, and without any need to sit down and set up.



HP says its research has defined two groups of mobile computer users. The first group want to be able to move their PC with them between work spaces — between two offices for example, or between the office and their home. This group is largely happy with current technology. They wish it were cheaper, lighter, and faster, but are generally satisfied. The second group includes sales staff, journalists, field workers, and others who need to use their PC wherever they may be, whether at a desk, or sitting on a porta-loo. This group has largely abandoned current technology to wait until things have got lighter, smaller and easy to use on the road, with instant-on and long battery life.

The OmniBook has been designed for people who want to use a computer while moving about, rather than being a full computer that people can take between workplaces. It's lighter at just 1.3kg, it's smaller (16.3 by 28.2 by 3.6cm), and it has been designed from first principals to work on the road. When you power on, you're instantly in exactly the state in which you powered down; all applications and documents open as they were, whether you'd saved them or not; and you can leave the system powered off indefinitely without losing the contents of RAM. Battery life is around 10 hours (nine hours with the flash-disk option), either from the internal batteries, or even from four AA batteries.

The keyboard is full-sized, with low flat keys that feel marginally odd if you sit at a desk and start typing. They have a firm and definite, but not very easy, response. Move the OmniBook to your knees, or hold it with one hand and type with another, and you're instantly aware of their advantage. The firm response allows you to type easily under adverse conditions.

The OmniBook saves energy by using a non-backlit display, but especially considering the units small total size, the inclusion of a full size 23cm screen as well as the full-sized keyboard in a unit so totally small is impressive. The screen is standard VGA 640 by 480, with 16 greyscale levels. It can become quite hard to read in low lighting conditions, and even not-so-low lighting conditions without a backlight, but the display itself is crisp and doesn't ghost.

Performance from the AMD 386SXLV 02 chipset was well behind other units, although the Graphic WinMark of 1.49 megapixels per second was not that far behind the pack. Using the 40M flashDisk option, which is by default DoubleSpaced, you get around 85M of free space, but performance for this was expectably low, with a Disk WinMark of 8692. PCMCIA slots allow you to use two 10M static RAM cards, or a 40M FlashDisk.

Windows, DOS, Microsoft Word and Excel, and a series of calendar, contact and calculation utilities, as well as LapLink Remote are bundled on a single ROM card, which can be upgraded later. These software packages actually run out of ROM, rather than loading into RAM, so the 2M of RAM onboard is free space for application usage, although it is still eaten away quickly. The version of Windows has been optimised to avoid the problems with system resource allocation typical on machines that are rebooted regularly. Because all RAM and drive contents are flash-based, they retain there contents even when deprived of power, allowing you to switch off the OmniBook and re-open it exactly where you left off.

When first playing with the unit, I had some problems with files on the ROM card 'disappearing' — such as the File Manager taking forever not to load, and finally returning an error. I later discovered a loosened panel on the underside, and while not convinced this was at fault, after a forced reboot, I've had no problems.

The other unique attribute of the OmniBook is its pointing device, a paddle-pop mouse, or mouse on a stick. It looks daggy at first, but once you get used to it, is surprisingly effective. You can even open the mouse out (with a pop-down hand support), and hold it for use semi-effectively in mid air.

The OmniBook has an infra-red port in addition to serial and parallel ports, and this can be used with LapLink to redirect drives to those on a suitably equipped desktop unit, or another OmniBook. Without the kit though, you'll need to play with cables as always, unless you rely on the external floppy.

After the initial lost-file problems, the OmniBook functioned perfectly. The power-management and battery life are a dream, and the ability to close down and open up where you were is a boon. These, with low weight, small size, and a good feel and form, make the OmniBook easily the best on the road computer yet, despite its flaws.

For more details, contact HP on (03) 272 2895. (See also First Looks review, page 35, August 1993, *APC*.)

AT A GLANCE

Compaq LTE Lite Series

Distributor: Compaq Computer Australia
Telephone: (02) 911 1999
Price: 4/33C, $9852; 4/25E, $4579
Specifications: LTE Lite 4/33C — Intel 33MHz 486SL CPU, 4M of standard RAM, upgradable to 20M, 209M hard disk, actrive matrix colour screen
LTE Lite 4/25E — Intel 25MHz 486SL CPU, 4M of standard RAM, upgradable to 20M, 120M hard disk, active matrix monochrome screen.

Compaq Contura 4/25CX

Distributor: Compaq Computer Australia
Telephone: (02) 911 1999
Price: $6872
Specifications: 25MHz 486SL CPU, 4M of standard RAM, expandable to 20M, 120M hard disk, active matrix colour display.

Compaq Concerto

Distributor: Compaq Computer Australia
Telephone: (02) 911 1999
Price: $5726
Specifications: 33MHz 486SL CPU, 4M of RAM, expandable to 20M, 250M hard disk, two PCMCIA Type II and one PCMCIA Type III slots, backlit LCD display

There are ports at the rear of the tablet that allow the connection of an external monitor and keyboard, and Compaq also offers a form of docking station that the tablet can sit in, known as a FlexConnect Convenience Base.

While most mouse/trackball units are attached to their respective machine, the pen for this unit is not. To overcome possible pen loss problems, Compaq has included two pen 'holders'. For transportation or long-term storage, the pen can be held in a foldaway case that is part of the tablet/screen base. Included in the design of the keyboard is a fold-up pen holder, much in the vein of an executive desk set. While a good idea, the pen must be placed in this at the correct angle to avoid it falling from the holder onto the keyboard.

The Concerto's proprietary keyboard has been specifically designed to be hot plugged. If unplugged, the keyboard can be reattached without a need to reboot — a warning beep tells you the keyboard has been successfully connected. The keyboard is hinged off the main tablet but is easily disconnected. There is a cord that stays plugged in, so that unhooking the unit does not mean disconnecting the keyboard. This cord is barely long enough — a few more inches would be handy — but at least it is manageable. The keyboard is far more supple than most Compaq portables, but still has the inherent Compaq short key travel.

When detached from the tablet, the keyboard can be sat up at an angle using the locking plate that normally attaches the board to the tablet. With the keyboard completely detached, the machine becomes a fully pen-based tablet.

Microsoft Windows for Pen is the platform supplied with the unit and Compaq has included some pen accessories to allow purchasers instant pen working capability. Slate for Excel allows Excel owners to turn their Excel spreadsheet into a pen-based application that not only allows navigation through the program, but also entry of data and the use of pen strokes to imitate commands. For example, the use of an s with a circle around it sums a column. Inkware is also included. This is a program that allows personal information management — notes, diary, to do lists and so on — to be entered using the pen. The information is either stored as written or converted to text. Handwriting recognition is okay, but Compaq tells us that it is only 90 per cent efficient. There are some proprietary management software programs developed by Compaq that allow better management of the features of your new Concerto.

The tablet has screen and battery settings as part of the hardware that are operated by the pen. There are also security features that are pen-based. The passwords are much like an autoteller's PIN number; they can be penned in from the onscreen dialogue box or typed on the keyboard. There is a 250M hard drive, 1.44M floppy and two Type II (one Type III) PCMCIA slots, while memory expansion is available up to 20M. The battery is easily removed from the rear of the unit and on rundown tests lasted three hours and 11 minutes; the second best result of the test group.

The screen is a very high-quality backlit LCD display made by Compaq, and the video drivers are onboard local bus. A carry valet case is included.

Even if this machine did not come with any of these wonderful features it should stand out for its performance. For all the tests carried out, this unit performed in the top 25 per cent of the test group. For the critical DOSMark, the unit ranked second with 29.97, 36 per cent above the average score. This result is directly attributable to the machine's winning Disk harmonic of 33.17 (46 per cent better than the average). The Concerto was not left behind on WinMark tests either. A Graphic WinMark of 4.73 megapixels per second (36 per cent above average) and a Disk WinMark of 29775 (25 per cent above average) proved that this machine is a genuine workhorse. Our summary of performance ranked this machine third behind the $8590 Sphere Futura 486DX2/66 and the $9232 TI Travelmate 486DX2/50. A combination of speed, physical setup and versatility make the Concerto a top performer.

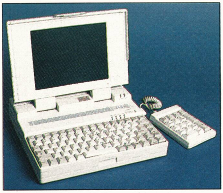
At only $5726, it is great value and lends itself as a contender for the notebook market. It is not heavy at only 2.95kg and is jam-packed with features. Compaq has a definite winner on its hands here and it is probable that this machine will be the start of very popular product line.

Edge 33

By David Lin

This chunky little monochrome 486DX/33 notebook a little out of the ordinary. Firstly, the creamy exterior sits a little taller than is normal for computers in this class, although the Edge 33 is true to the notebook tradition in covering only the dimensions of an A4 sheet in footprint area. Secondly, all expansion ports normally associated with the rear panel have been removed to either side to accommodate the battery pack, which piggybacks onto the back in a seamless fashion. There are sockets for an external keyboard, VGA monitor and a COM port on the left side, and on the right side you find a second COM port, power in, numeric keypad and parallel port. The numeric keypad comes standard. Our review machine also came with a smart vinyl carry case.

The notebook's lid is attached by a moulded clasp. Opening and adjusting the LCD panel reveals a conventional looking keyboard and some LED indicators. The display is monochrome VGA on the LCD, translating to colour with an external monitor. Setting up an external monitor



The monochrome Edge 33 costs less than $3000. Best feature: good DOS performance in our benchtests

AT A GLANCE

Edge 33 Notebook

Distributor:	Edge Technology
Telephone:	(02) 906 5550
Price:	$2999
Specifications:	Intel 33MHz 486DX CPU, 2M of standard RAM, upgradable to 16M, 130M hard disk, monochrome LCD display.

involves loading a device driver called NOTE3500.SYS, which is provided and allows you to configure the video display for LCD or CRT or internal/external display adaptor, display fonts and hard disk sleep. There is also a Windows utility that allows you to do the same in Windows. 2M memory is standard expandable to 16M, and an optional docking station allows further traditional expansion using the ISA slots provided in the base unit. There are no other proprietary extras that can be fitted to the Edge machine.

Memory expansion is awkward, involving SIPP modules which are placed by dismantling the battery pack and keyboard. There is no other access to the memory slots. Edge's manual even recommends service personnel should be enlisted for any memory upgrades, what is in effect the most basic upgrade that would be performed on this machine. An unusual feature was the toggle switch housed alongside the VGA and COM1 ports, which allows you to enable and disable an external keyboard. Normally, you will find just a simple software-only solution to enable one keyboard or the other.

In our benchmark tests, we were a little surprised by the reasonable showing this machine gave against some stiff competition. The straight DOSMark scores shows it consistently ranked in the range just above middle of the road, rating eighth overall on DOSMark performance. The video score was deplorable, but the Edge hung in there by dint of its 33MHz full DX processor and fast disk subsystem, which polled sixth. In the Windows stakes again, the Cirrus Logic-based chipset does not seem to make the grade, while the disk score was average. No proprietary video drivers were included, which one would imagine would have made a difference to the Windows result.

Our Battery Rundown tests concluded the Edge to be a modest performer, although power management will improve the one hour, 39 minutes. Be thankful the display is only monochrome instead of colour, or battery life would have been in some trouble in our tests.

The Edge 33 will win many friends with its listed price of just under $3000. My personal preference would have seen a pointing device instead of the dedicated numeric keypad, to name a major gripe, but no doubt there are those who would look on this as a thoughtful move especially if you prefer working in DOS character-based applications. The monochrome display is not the best, but is reliable technology. Upgradable options are not comprehensive, so if the Edge does take your fancy, do not think there is the luxury of upgrading to your heart's content further on down the track.

IBM ThinkPad 350C

IBM ThinkPad 720C

By Jeremy White and Sheryl Canter

Nothing better represents IBM's resurgence in the personal computer industry than its ThinkPads. These are not only class notebooks, they are genuinely innovative technological achievements. The motto "No one ever got sacked for buying IBM" has become ironic lately, with IBM responsible for more job losses than Jeff Kennett and quarterly losses that make Bond and Skasey look like amateurs playing kid stakes. But if its Personal Computer Company can continue to produce equipment of this quality and even beauty, the phrase may regain some credence.

It took IBM years to enter the portable market seriously, and it is only in the last 12 months that it has become a respected contender. Big Blue now has a clear intention to take a ride on anything mobile. Some US analysts are even portraying IBM's revamped PC Company, and especially its mobile efforts as a model for the entire conglomerate's recovery.

IBM has just expanded its notebooks with the addition of the new value-line ThinkPad 350 and 350C, and has entered the HP-owned and partially created 'useable' sub-notebook market with the ThinkPad 500. It is also releasing a new high-end 'multimedia capable' notebook, which was to have originally been based on new clock-tripling chip technology from IBM. According to the first reports from the US, however, the just-released 750c is based, like the NEC Versa and Compaq 4/33c, on Intel's 486SL/33.

While the new ThinkPad 500 subnotebook and ThinkPad 750C were not available in time for this set of reviews, we have included reviews of the ThinkPad 350C and the 720C.

The ThinkPad 750C, nonetheless, continues IBM's refound spark for innovation. Building on the basic form of the 720C, the new model is smaller and lighter, weighing 600g less, and half a centimetre slimmer. It uses the same excellent 10.5in active matrix 256 colour screen. You can raise the keyboard on the 750C, however — the same superb Lexmark keyboard — and this provides access to a 170 or 340M removable hard drive and a removable floppy drive. In theory, this space will enable you to install a wireless modem or, even more interestingly, a TV receiver and tuner.

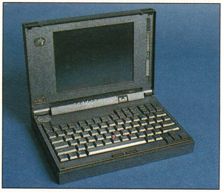
The TV receiver will be available around the end of summer, and was previewed at the Museum of Television and Radio in New York. The 750C includes inbuilt sound input and output off the shelf, and with enhanced video and 256 colour support, you can look forward, given funds and inclination, to sitting on the train with your ThinkPad watching the news on the way home.

The ThinkPad 500, is based on IBM's clock-doubled 50MHz 486SLC2. It will weigh just under 1.6kg, with a near full-size keyboard, and a screen measuring 19.5cm diagonally. You'll be able to plug it directly into a wall outlet to recharge the battery, and it will also have a single Type II PCMCIA slot.

ThinkPad 350C

The 350 and 350C are IBM's mobile Value-Point equivalents, designed to compete directly with Compaq's Contura and Zenith's Z-Sport. Whereas the company's competitors have used both scaled down features and performance to reach their price-points, IBM has produced a unit without the expansion and feature options of the 720, but with the performance largely intact.

This is a new release from IBM, and must have been a preliminary unit, as while it worked fine for a while, it locked up and refused to power-up before we finished testing. After trying to trace the problem, taking punts on various combinations of it being password protected or the battery being loose, we gave up and returned the



The ThinkPad 350C combines first class lineage and performance with a fair price

A classic decision.

Portable computing is today a reality in the process of making business decisions. The more powerful and versatile the better. Therefore, choosing the right notebook is often a pretty momentous decision in itself.

While the intrinsic qualities and outstanding performance of the NOVALETTE 4250Si allows you to extend power beyond the capabilities of its competition, there are still even greater capabilities abound.

With the NOVAlette 4250si, you and your Power Notebook can literally grow together, matching one's skills to their other's power. This is the perfect harmony between Man and Machine. A statement in human engineering we call Technological Ergonomics. Plugging new processors to meet the growing demands of your business needs. Upgrading from 213MB to over 400MB of hard disk drive capacity as well as increasing memory to 16MB to cope with the new Windows NT open operating system. With the NOVALETTE DC 4000S Desktop Coupler, there is now a docking station that links the Power Notebook to enhanced options like a SCSI external hard disk (or scanner, tape drive,etc) or Digital Audio backup drive for far greater storage abilities. Or the world famous Standard Micro Corp (SMC) Elite -16 network card to access your office base LAN environment. Even a Cirrus Logic or Paradise Windows Accelerator XGA-standard video display adaptor.

Professional musicians simply attach the NOVA-Approved Roland SCC-1 soundboard for linkage to their production studio environment. From there, you can also plug in a MIDI (GS)-compatible Roland PC200 and use the Novalette 4250Si as your portable music station on stage - another way of saying

"Simply Brilliant Technology" Only from the people who brought you the NOVA concept.

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ACN 059 670 254
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Victoria 3205, Australia
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unit to IBM, who were unable to return the unit in time to complete our tests.

There was only one incomplete result for the 350C despite this, — the Graphic's WinMark — which had only been tested with its 'as shipped' driver, so the last placed result of 1.59 megapixels per second was not optimal.

In all other results, the 350C tagged the 720C very closely, and we'd expect that had the tests been completed, the Graphics WinMark result would have been similar to the 720C's result of five megapixels.

The 350C's DOSMark was in fact better than the 720C's, placing it 17th at 21.93 to the 720C's 19th ranking score of 21.68, helped by a strong DOS Disk harmonic of 22.47.

Even with its abysmal Windows graphics result, the 350C was placed 19th overall, between the Sharp and NEC Versa/25M.

Raw battery life for the 350C was the 14th best in our comparison, and 13 per cent above average at two hours, 19 minutes. Power management was excellent, one of the few units which supported all our management criteria, including CPU and peripheral wind-down and full RAM dump to disk hibernation.

You can pick the difference between the high-end ThinkPad and this workhorse though, independent of the price. The overall feel was not as rugged, despite similar appearance and styling, and the passive matrix colour screen, while good, did not match the Contura's Sharp dual-scan, and can't be compared at all with the 720C's huge and superb active matrix colour.

Opinions were mixed as to the value of the TrackPoint II mini-joystick cursor control plucking up from mid-keyboard. Personally I find it takes acclimatisation, but after a period of use you grow to prefer it to any other method. You can't use it for designs with finesse and grace, but then neither can you use a mouse this way, so it's just dandy.

IBM's new direct push and 24 hour, seven day support, with 12 months onsite warranty, make this a pricey workhorse at $5611.88, but a well supported and very capable one, and we trust that whatever preliminary problems there may be with the 350C will be long gone for production models.

ThinkPad 720C

IBM hit a home run with the ThinkPad 700C, and Big Blue has done it again with the IBM ThinkPad 720C. Since the system is priced at $9000, you may find a cheaper notebook, but you'll be pushed and have to look carefully to find a better one overall. The 8.9-pound (travel weight) 720C uses a faster chip (IBM's own 486SLC2 25/50MHz) than the 700C, has a longer battery life, and adds a PCMCIA slot.

AT A GLANCE

IBM ThinkPad 350C

Distributor: IBM Direct
Telephone: 008 815 154
Price: $5612
Specifications: Intel 486SL/25, 4M of RAM upgradable to 20M, 125M hard drive, 23.3cm passive colour display, PCMCIA

IBM ThinkPad 720C

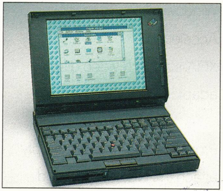
Distributor: IBM Direct
Telephone: 008 815 154
Price: $9000
Specifications: Intel 486SLC2, 4M of RAM upgradable to 16M, 160M hard drive, 26.7cm active matrix display, PCMCIA

The 10.5in active-matrix thin-film transistor (TFT) colour screen is, in a word, stunning. When the machine runs in text mode, the screen background is a dark, solid black, providing excellent contrast. When the machine runs in graphics mode, the colours are both sharp and even.

The ThinkPad 720C uses a unique pointing device called the TrackPoint II, which looks like a pencil eraser. It is located between the G and H keys. Pressing on the TrackPoint II moves the mouse cursor around — heavier pressure increases cursor speed. The two mouse buttons are both conveniently located below the Spacebar.

The keyboard is also exceptional. The spring-loaded keys give satisfying resistance when typing. The cursor keys are arranged in an inverted-T layout and are positioned in the lower-right corner of the keyboard.

The IBM ThinkPad 720C is a superbly engineered machine that scored above the average on all our benchmark tests and turned in a solid 2-hour Battery Rundown test time. If you can afford it, this is the notebook to buy.



The 720C is admirable for it's 26.7cm screen and TrackPoint II pointer

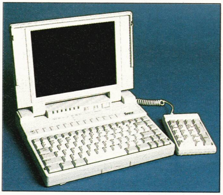
Natcomp Inex 4100

Natcomp Inex 4500

By Stuart Bowman

We received two machines from Natcomp: the Inex 4100 and the more powerful Inex 4500. The Inex 4500 never got off the ground, so we have no benchmarks for it. However, at $2595, the Inex 4100 is one of the cheapest laptops reviewed; it is based on a 486SLC 33MHz processor and includes a 210M hard drive.

The benchtest results for the Inex 4100 were lacklustre, however. Its DOSMark of 17.03 was 23 per cent below average. The Cyrix processor is effectively a 386 on steroids of sorts, and as a result the Processor harmonic was a low 3393. The Video subsystem was one of the slowest reviewed — with a harmonic of 899, it was 71 per cent below average. The hard disk is the machines strongest asset: six per cent below average for the DOS harmonic and 22 per cent below average with a Windows DiskMark of 18613. At 1.69 megapixels per second, the graphics score was 52 per cent below average.



The $2595 entry-level Natcomp Inex 4100 offers value for money. Best features: large monochrome display and 210M hard disk

The screen is 24cm across and capable of displaying 64 grey shades. Like many cheaper LCD screens, there is a slight problem with ghosting and a limited viewing angle.

While the Inex 4100 is well layed out with easy memory expansion and a tactile keyboard, extra features such as PCMCIA slots, internal trackball and APM have been omitted. Display and hard disk powerdowns are the only form of power manage-

AT A GLANCE

NatComp Inex 4100

Distributor: Natcomp
Telephone: (02) 555 7466
Price: $2595
Specifications: 486SLC 33MHz Cyrix CPU, 2M of RAM, upgradable to 8M, 210M hard disk, monochrome LCD display.

NatComp Inex 4500

Distributor: NatComp
Telephone: (02) 555 7466
Price: $3695
Specifications: Intel 486SX 25MHz CPU, 4M of RAM, upgradable to 24M, 210M hard disk, two PCMCIA slots, sound card, monochrome LCD display.

ment. In rundown tests, the battery lasted one hour, 51 minutes.

For $3695, the Inex 4500 comes with a sound card, 486SX/25 processor, internal trackball and two PCMCIA slots. With the faster processor, improved benchmarking results and video performance would be expected. As already noted, the Inex 4500 also includes an 8-bit sound card for business audio applications.

Our general impression of the Inex Series is that the lack of quality control is a be a bit of a worry — as we've said before, if a company can't have its products in good working order for a review, what hope does the mug punter have? But with a three-year warranty and toll-free tech support five-and-a-half days a week, any problems should be solved quickly and easily, and we hope that in this case Inex were simply unlucky.

The Inex 4100 is a good entry-level laptop that would complement any desk-based machine, particularly if finances are limited and price is more important than power and expansion.

Laser LT421

By David Lin

Adelaide-based Laser VTA submitted its monochrome LT421 notebook, a Cyrix 486SLC-powered machine running at a rated 33MHz, but by our reckoning clocking 37MHz-plus for this review. The LT421 came in a light-beige case with a floppy drive at the front, next to a removable hard drive unit; a reset 'button' and power input at left and two serial, one parallel, one PS/2-type keyboard and one VGA port in the back. There are two 'cut-out' tabs alongside the reset, which provide access for a phone-in and phone-out line if the optional internal modem is used.

The twin-hinged screen opens up to a monochrome display, which we had no trouble using and gave ample real estate. What struck my notice immediately too was the profile of the keyboard. Though the keyboard was almost a standard notebook's 85-key keyboard, the backslash key was placed to the right of the spacebar, making it just a little awkward to handle initially. Also, the actual height of the keys is raised almost like a conventional keyboard, contrary to current trends for very low-profile keyboards on notebooks. The response from the keyboard setup was dynamic, however, making up for the need to do hunting and pecking for keys. Brightness and contrast are controlled by sliding controls located above the keyboard, while above this is the power switch. The display panel is uncluttered by any switches or indicators.

Internally, the LT421 comes with 2M of RAM standard, upgradable to 10M. The memory is proprietary and the manual does not give any indication to how an owner can upgrade any components themselves rather than take it to Laser's service people. While AMI has supplied the BIOS, the CMOS setup is not one of the usual types seen on PCs, but it is as comprehensive as any of the well-known setup programs, especially in the way of power management. Even without power management enabled, the battery rundown test was a creditable seventh overall; people on the road will love the machine's miserly characteristics when it comes to running with power management enabled. There is a Suspend/Resume button above the Escape key for added economy. The hard disk also fits into the energy efficiency scheme with a standard shutdown linked to the CMOS or a manual setting.

While on the subject of hard disks, Laser provided this review unit with a generous 210M hard disk. Some accompanying literature said it was a Seagate, although it was impossible to determine exactly for fear of damaging the machine. The most significant feature though was the easy detachability of the hard disk unit via a simple clip on the underside. This disk was a solid performer too, scoring 25.68 on our DOS Disk harmonic and similarly placed in the Windows Disk WinMark.

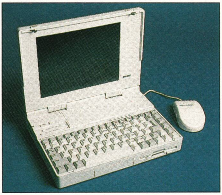
AT A GLANCE

Laser LT421

Distributor: Laser VTA
Telephone: (08) 232 4141
Price: $3300
Specifications: Cyrix 33MHz 486SLC CPU, 2M of standard RAM, upgradable to 10M, 210M hard disk, monochrome LCD display

ARK COLLEGE LIBRA

The processor score in the lower end of the field was indicative of the general consensus that the Cyrix chip is inferior to the Intel, although this might be a bias of benchmark testing in general. Laser missed the boat on the video score too in both DOS and Windows, coming in below average. A question that is asked is where the comprehensive suite of video drivers went: the well-written user manual mentions a utilities disk which supplies the drivers, but it was nowhere to be found and would have improved the Graphics WinMark if nothing else.



The Laser LT421 from Adelaide-based Laser VTA. Best features: keyboard and large, easily detachable hard disk

Overall, Laser has produced a middle-of-the-road machine that is attractively priced. Software supplied includes DOS 6.0, although our review machine also came with Windows, Central Point's PC Tools and Microsoft Works for Windows, which with an internal modem, fax/modem and coprocessor, make up the list of optional extras for this model.

Mitac 4020G/C

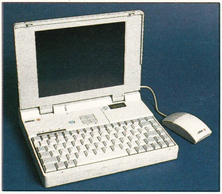
Mitac 4028G

Mitac 4020F

Mitac 4020G/CT

By David Lin

Outwardly, the similarities between Mitac's 4020G/C, 4028G and 4020F are almost imperceptible. We also reviewed the 4020G/CT, which is covered at the end of the Mitac reviews. Of the first three



The monochrome, Intel 25MHz 486SX-based Mitac 4020F. Best feature: performance results

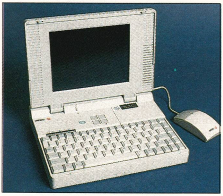
machines, the same off-grey case, location of drive, ports and 'cut-outs' apply. The left side is occupied by the 3.5in floppy drive and behind it, a 'cut-out' offers access to the hard disk. At the rear are ports for power, parallel, serial and an external PS/2-type keyboard, while there is a hatch for a docking station expansion port on the G/C and F models, the 4028G having the hatch but no port behind. On the left of the machines we have the VGA port and a 'cut-out' for an optional internal fax/modem. On the underside you'll find access for removing the NiCad battery and a hatch for a coprocessor.

Under the machines' display panel there is a conventional keyboard. Above these is an array of LED indicators, a power on/off switch and button controls for brightness and contrast. The only superficial difference lies in the louvres found on the colour 4020G/C. The monochrome 4020F and 4028G have a slightly greater display area too. Apart from the two display technologies, you have to go under the hood to find the real differences between the models.

All units are 486 machines. The 4028G has a Cyrix 33MHz SLC chip; the 4020F features an Intel SX/25, and the 4020G/C is driven by an Intel SX/33 CPU. A Phoenix BIOS and Cirrus Logic GD6410 VGA chipset is used on the SLC, while the other two use a Chips and Technologies implementation. The SLC machine is the odd one out of this collection, and there is a separate manual and utilities acknowledging this fact.

The monochrome Cyrix 33MHz 486SLC Mitac 4028G. Best feature: the machine's price tag

In use, the three models exhibit their own peculiarities that are most likely just differences in their components. For example, the 4020G/C had a frustrating tendency to stick on keys if you did not hit them at the right angle. The spacebar was especially guilty of this. The 4028G had a similar tendency, but not as pronounced. As a variation on a theme, the 4020F had an even more annoying tendency to repeat keys at the slightest provocation — one fraction of a pause on a key and your entry was repeated. The hard disk also howled like a banshee, noisier than some desktop machines from past memory; you could imagine you were on an airport viewing deck at times. All three models ghosted onscreen.



The colour, Intel 33MHz 486SX Mitac 4020G/C. Best feature: performance results

In terms of outright performance, the Intel CPUs were respectable, figuring positions nine and 10 in the DOSMark and Relative overall score, the monochrome 4020F being a slower processor and scoring lower. You fall back to 28th position for the Cyrix-based 4028G, which even though featured a 33MHz clock speed, still dipped its lid to the 25MHz 4020F. In processor performance alone, there was a difference of 30 per cent between them over the same tests. There was another leap forward again to the 4020G/C, which was 37 per cent above average.

The same could be said for the video and memory scores among the three machines, although we must mention that the 4020G/C topped the table with an outstanding rating in Memory harmonic tests, while the 4020F was just pipped into third spot and the 4028G, coming in 4661, or 10 per cent below average. In video performance, the mono 4020F turned the tables on the colour 4020G/C, both being above average. Where there is an anomaly is in the disk ratings, where the spread of scores narrowed and only the 4020F performed above average and even the 4028G Cyrix-based machine stole the barest of margins over the 4020G/C colour model.

In the battery economy stakes, the monochrome SX 4020F stole ahead of the monochrome SLC, and not surprisingly, the colour display and greater clock speed of the 4020G/C saw it lag down to 36th position overall on the table. In both the Windows test scores, the colour 4020G/C and mono 4020F beat the 4028G machine.

If there was to be any choice to be made here it would have to be between the two 4020 models. The Cyrix chip just does not have the oomph for the job; the main board they have used lacks expansion to a docking station and the $200 difference between that and the 4020F's Intel 486SX/25 does not justify the saving. The 4020G/C might have priced itself out of contention. For

AT A GLANCE

Mitac 4020F

Distributor: Mitac Australasia
Telephone: (008) 035 645
Price: $3195
Specifications: Intel 25MHz 486SX CPU, 4M of RAM, expandable to 20M, 120M hard disk, monochrome LCD display.

Mitac 4028G

Distributor: Mitac Australasia
Telephone: (008) 035 645
Price: $2995
Specifications: Cyrix 33MHz 486SLC CPU, 4M of RAM expandable to 18M, 120M hard disk, monochrome LCD display.

Mitac 4020G/C

Distributor: Mitac Australasia
Telephone: (008) 035 645
Price: $4995
Specifications: Intel 33MHz 486SX CPU, 4M of RAM, expandable to 20M, 120M hard disk, passive matrix colour display.

Mitac 4020G/CT

Distributor: Mitac Australasia
Telephone: (008) 035 645
Price: $7990
Specifications: Intel 33MHz 486DX CPU, 4M of standard RAM, upgradable to 20M, 120 hard diisk, PCMCIA Type II slots, active matrix colour display.

$4995 for the 4020G/C, a 486SX/33 with passive-matrix colour, you can do better. On the wish list is a safety-net for the future with PCMCIA slots and non-proprietary memory, although you could not blame anyone in leaving the memory subsystem alone in the light of the benchmark scores. And if portability is paramount in your notebook, you could check the marvellous carry bag that Mitac has, which keeps everything snug and looks attractive too.

Mitac 4021G/CT

The 4021G/CT is a 486DX33-based notebook that comes with an active matrix display and is housed in a streamlined case that includes a keyboard palm rest with an internal, centrally located trackball.

This was the highest-rated machine in the Mitac Australasia range. On our overall Relative performance rating, the machine came fourth. The most outstanding feature of the unit was its video performance. It came first on both the Video harmonic (8442.15) and Graphic WinMark (12.25 megapixels per second) tests. The DOSMark of the unit was 23.16. This performance is due to 1M of local bus VRAM. The Disk harmonic of 20.79 was nine per cent below average and was the main reason that this unit's DOSMark did not match its video performance. The Disk WinMark also highlighted this mid-range disk performance with a score of 23528, two per cent below average. The battery lasted two hours on the rundown tests.

The unit comes with two Type II PCMCIA cards that are easy to use, and there's a Hitachi active matrix display standard with this $7990 unit. Standard RAM is 4M for the base unit, but it is expandable to 20M. Optional with this unit is an internal multimedia card that is compatible with both the Microsoft Windows sound system and sound blaster.

The Mitac 4021G/CT is a high performer, and for $7990, it would be a worthwhile choice for users that want good performance and a decent feature list, but don't want to spend the extra bucks for a more expensive well-known brand-name machine.

NEC UltraLite Versa/33C

NEC UltraLite Versa/25M

By Jeremy White

It's not often that you develop a passion for anything that costs $8468 (the Versa/33C), or even $4871 (the Versa/25M), but I should probably have passed this review to someone else to do, because the Versa inspires guilty passions.

While the Versa/33C is NEC's top-end offering, we'd expected that it would be outperformed in our benchmark tests by a number of lesser-known machines such as the Pearl, the Chicony notebooks, and the Sphere Futuras, based on their clock-doubled 486DX2/66 processors. In the same way that Texas Instruments DX2/50 TravelMate blitzed the benchmarks over these on-paper superior units, however, the Versa managed to largely keep pace with them, proving again that engineering and design have as great an impact on performance as raw processing power.

What was more surprising was that overall, the NEC easily outpaced Compaq's equivalent offering based on the same 486SL/33 processor, although interestingly Compaq's Concerto pen-notebook outstripped both units, to be in turn whipped by the DX2/50 TravelMate.

While the Versa's performance is excellent for its specifications, it is not performance that sets it apart. If you want pure power, choose the TI DX2/50. If you want a class all-round computing companion, choose the Versa/33C.

The Versa really is distinguished by superior design, both in its engineering and aesthetics. This is one cool-looking PC, with a soft grey-moulded case that curves around the front of the keyboard and closes with an reassuring spring-lock click. It has a rugged, but very pleasing feel to it, and the keyboard is easily the best of any notebook in the review set, although still not perfect, with good response, a firm feel, and excellent travel.

The entire unit is modular. You can easily remove and swap the hard drive, which is held in a bracket beneath the area above the keyboard, replace the floppy drive with a second battery pack, and even remove the lid and screen casing. The battery is easily removed, but uses an intelligent clasp combination so it's unlikely to come loose unless on purpose, and there are two free PCMCIA Type II slots, and a card memory upgrade path.

The mono NEC UltraLite Versa/25M retails for $4871. It also features superior aesthetics and engineering and has an easy upgrade path to the Versa/33C

This modularity allows for multiple users to share a single notebook, each with their own hard drive. It also provides an easy hard drive upgrade path, greatly extended battery life of anywhere up to a theoretical ten hours, and, from the monochrome Versa/25M an easy upgrade path to full 256 active matrix colour.

Power management is controlled by Fn-function key combinations, or through DOS or Windows utility programs. The power management mode can be toggled on the fly from the keyboard, with the current battery status and mode shown on a small display above the top-left of the keyboard and power switch. As well as Suspend, the Versa supports hibernation, where the contents of RAM are dumped to disk before power down, and upon re-powering, the user's previous environment is fully restored. You can also configure the power-down time of individual componentry, including lower screen brightness and toggling the backlighting on and off. Microsoft's Advanced Power Management standard is supported.

NEC's $8468 UltraLite Versa/33C features an active matrix colour screen. Best feature: superior aesthetics and engineering

The raw rundown battery life for the Nickel Metal Hydride batteries used was excellent. The Versa/25M had the second best result, a pure time of just under three hours 15 minutes, just behind the 486SLC-based Canon, but without any of the performance degradation of that unit's low-consumption Cyrix 16-bit chip.

The active matrix colour, and higher clock speed of the Versa/33C drew significantly on battery life, with a raw rundown time of just under the average of two hours, although this was the best battery life of any of the 33MHz or better colour notebooks.

Over a week's usage though, real-usage battery life was typically between four and five hours for the Versa/33C. On the road battery life is very much based on individual usage, and in my case, work tends to be orienteered around long periods in the one application working on the same documents, which allows processor and hard drive spin-downs to have full effect.

This result was in line with the rated battery life for the Versa/33C of four to six hours, and indicates that installing a second battery pack instead of a floppy on the road could give you 10 hours plus of continuous power, although in many cases I think you'd be looking at closer to six or seven hours. At 2.5 to five hours, the rated battery life for the Versa/25M was surprisingly lower — considering the excellent rundown result — although I found it lasting well over four, which likely translates to an on-the-road life with second pack of anywhere up to eight hours or more.

The NEC-manufactured active matrix screen on the Versa/33C is superb, measuring 24.5cm (9.6in) diagonally, which while not as large as IBM's ThinkPad 720C, is 2.5cm larger than standard. The review Versa had only one defective pixel, and NEC has a replacement policy for screens suffering from significant pixel-dropoff. The monochrome LED on the Versa/25M was crisp with little ghosting or shading, although once you've seen the Versa/33C's active colour, you won't suffer it easily. The active matrix display supports 256 colours at 640 by 480, with simultaneous external display. Sole external display is supported at 256 colours at 800 by 600 and 16 colours at 1024 by 768, although the Versa/25M only supports 16 colours externally at 800 by 600 or greater resolution.

The display and lid on the Versa can be inverted and closed, forming a potential pen-tablet, although the pen upgrade has yet to be released. The backplane of the Versa runs from a lowered plateau, allowing the screen to be folded back flat without interfering with any connectors or cabling. In addition to a VGA port, the backplane has separate PS/2 mouse and keyboard ports, a high-speed parallel port and serial port.

Although there is no internal modem bay or integrated network adaptor option, there are two PCMCIA slots free (optionally one Type III), and my first two purchases would be an Ethernet card and 14.4K fax modem card — NEC does offer a modem card bundle.

There are two points of form that NEC needs to correct. The first is the choice of a standard PS/2 connector BallPoint mouse. This mouse squeaks, and although it's easy enough to hook up, it's a hassle, and gets in the way trying to access the floppy drive and the page control keys. The snap-on QuickPort connector used on the TravelMates is better, with the drive accessible from the front rather than the side.

NEC does not offer a port replicator for the Versa, but it does have a desktop expansion unit, with the docking port located at the back left, although with the expansion and performance, I can't see to much need for this.

AT A GLANCE

NEC UltraLite Versa/33C

Distributor: NEC Information Systems
Telephone: (02) 930 2000
Price: $8468
Specifications: Intel 33MHz 486SL CPU, 4M of standard RAM, upgradable to 20M, 180M hard disk, two Type II one Type III PCMCIA slots, active matrix colour display

NEC UltraLite Versa/25M

Distributor: NEC Information Systems
Telephone: (02) 930 2000
Price: $4871
Specifications: Intel 25MHz 486SL CPU, 4M of RAM standard, expandable to 20M, 120M hard disk, two Type II or one Type III PCMCIA slots, monochrome LCD display.

The power supply, while quite light, is far too large, and combined with the curved design of the Versa makes for a big package. The Versa's main body is also quite high, which takes some acclimatisation when first typing, and combined with a thick lid means that the Versa can't fit into small or handheld carry cases such as Compaq's. For its size, the Versa/33C's weight of just 3.1kg is good, and the size and rugged feel are appreciated while you're working, if not lugging. The Versa/25M is much lighter, at just 2.7kg, although its size is identical.

Performances for both notebooks were strong. The Versa/25M was huddled at 18th overall just behind the other 25MHz name brand units, the TravelMate and ThinkPad. The Versa/33C was far more impressive. While it rated eighth overall, its performance was just behind that of a block of 66MHz-based clones, ahead of all name brands except the DX2/50 TravelMate and the Compaq Concerto pen-notebook, which was helped by its superb disk performance.

The disk subsystem used on the Versa/33C is excellent, especially considering that the 180M drive is removable, ranking third overall with a result of 29.54 and 30 per cent above average. This good drive performance was carried under Windows where the /33C ranked fourth with a result of 31,784 — 33 per cent above average. The drive performance of the Versa/25M was less impressive, ranking 27th under both DOS and Windows.

Windows graphics performance was the best of any name-brand notebook, coming sixth behind 66MHz-based machines only with a score 57 per cent above average of nearly 5.5 megapixels per second. The C&T chipset and local bus video implementation really shined in combination with active matrix colour, although the Versa/25M also scored a surprising 10th under standard 16 colour VGA.

I'd like at this stage to say the Versa has some fatal flaws, and inject some objectivity, but it's not true. I can't even fault it too much on price, as active matrix colour, full features and 33MHz performance for $8468 compares very well with the prices for similar-range units from Compaq ($9852), TI ($9232), Toshiba ($8693), and even Mitac ($7990) and Sphere ($8590). The Versa/25M for $4871 appeals for the same form and features, with slower performance and a monochrome (if very upgradable) display.

NEC offers toll-free technical support, and has a three year standard warranty, plus one year international warranty. Onsite service is $100 for the first year. At the time of going to press, NEC was offering a free printer or monitor with each Versa sold while stocks lasted.

NEC pioneered notebook computing with the original UltraLite, but then became lost in the advances made by Toshiba, Compaq and TI. Reviewing is a subjective procedure, especially notebook reviewing, but on specs and performance, the Versas are impressive. With the best keyboard, strong performance, easy upgrade paths, and elegant form, the Versa series is not perfect, but to my mind it's damned near close.

Olivetti Philos 22

Olivetti Philos 33

Olivetti Philos 44

Olivetti Quaderno

By Stuart Bowman

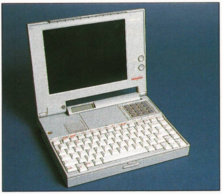
With such stiff competition in the laptop market, it is the little things that often make the difference. Olivetti has attempted to implement every function possible into its range of laptops and subnotes. Some of these are great, while others are more flim than flam.

Olivetti has two entry-level machines — the fully featured Philos 33, which is based on the 386SL/20 chip ($3795), and the

Along with the Philos 33, Olivetti's Philos 22 makes up the company's entry-level line. The Philos 22 has less features, but proved more powerful than the Philos 33

Philos 22 ($3645), which is based on the 486SL/25 chip but skimps on the additional features of the Philos 33. The $4395 Philos 44 is the flagship of the Olivetti range. Its 486SL/25 chip and 120M hard drive, distinguish it from the 33, which has the slower processor and 84M hard drive. Olivetti also has a colour version of the Philos 44, which was not submitted for this review.

The benchmarking results are similar for the 22 and 44 except for disk throughput and a slower DOS video score on the 44. The Philos 44 scored a DOSMark of 21.75: four per cent below average. The difference between the two machines in their disk scores under Windows was a quite significant 22707 and 18802 for the 44 and 22 respectively. Windows graphics were nearly identical at 2.10 (Philos 44) and 2.24 megapixels per second for the Philos 22.



The Philos 44 is the flagship of the Olivetti range. Best features: price/performance mix and built-in extras

The benchmark results for the Philos 33 were not completed in time to be included in our tabulated results, and not ranked for this review. However, in preliminary individual tests, the processor score for the Philos 33 of 2457 was nearly half that of its faster siblings. The Windows graphics score of 0.69 megapixels per second was slowest overall, while a Windows DiskMark of 13098 was second slowest (45 per cent below average).

The floppy drive (optional on the Philos 22) can be removed and the power supply inserted in its place, alleviating the extra baggage when travelling. By lifting the keyboard, the battery can be replaced, and on the Philos 33 and 44 models the hard drive is also removable. All models feature function hotkey control ROM-based utilities and power management, and the same 10in LCD screen and keyboard (a numeric keypad is also included on the Philos 33 and 44). By pressing a button on the side a small trackball pops out; it takes a little while to get used to, but is certainly useful when on the run. The VGA screen is capable of 64 shades of grey, however it does have a problem with ghosting and the viewing angle is limited.

For portability, the Philos 44 (1700 mAh) won out at two hours and 33 minutes in our battery tests, while the Philos 22 (1200 mAh) pulled in just short of two hours.

The Philos 33 and 44 are designed with functionality and expansion in mind, and include a PCMCIA port and expansion socket for a port replicator. As with the Quaderno 33, they also feature a digital sound chip on the motherboard, a speaker and inbuilt microphone that can be used for recording brief messages to the hard drive.

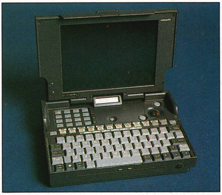
For price and performance, the Philos 33 has been squeezed out by its siblings. If price is of concern, then you'd do better with the less feature-packed but more powerful Philos 22. For a fully-functioned mono, the Philos 44 is an excellent buy. All machines come with DOS 6.0, Windows 3.1 and Lotus Organiser, and a 12-month international warranty with toll-free tech support.

Quaderno 33

Offering a whole host of features packed into a 1.3kg box half the size of a sheet of A4 paper, the Quaderno 33 is neither a laptop nor a subnote, but fills a void somewhere in between to bring a whole new world of personal computing and information technology to people on the run.

The $3495 machine is based on the AMD 386SXLV/20 processor. The disk system could not cope with our PC Labs benchmarks, so as such we are without a DOSMark score. (What tests that were completed are not included in our tables.) With a processor score of 1729 (72 per cent below average), WinDisk of 6704, and Windows Graphics of 1.01 megapixels per second (72 and 76 per cent below average respectively), applications can take a while to load, particularly under Windows.

The display, a 7in backlit transflective LCD, is capable of a 640 by 480 resolution, and 16 shades of grey. Unfortunately, there is considerable ghosting and the viewing angle and lighting conditions are limited. The keyboard is small, with an added numeric keypad to the top left, and hotkey



The Olivetti Quaderno weighs just 1.3kg and is half the size of a standard notebook. Best feature: built-in sound chip and voice processing software

AT A GLANCE

Olivetti Philoss 22

Distributor: Olivetti
Telephone: (02) 748 3390
Price: $3645
Specifications: Intel 25MHz 486SL CPU, 4M of standard RAM, expandable to 32M, 84M hard disk, monochrome backlit LCD display.

Olivetti Philoss 33

Distributor: Olivetti
Telephone: (02) 748 3390
Price: $3795
Specifications: Intel 20MHz 386SL CPU, 4M of standard RAM, expandable to 32M, 84M hard drive, PCMCIA slot, monochrome LCD display.

Olivetti Philoss 44

Distributor: Olivetti
Telephone: (02) 748 3390
Price: $4395
Specifications: Intel 25MHz 486SL CPU, 4M of standard RAM, expandable to 32M, 120M hard drive, PCMCIA slot, monochrom LCD display.

Olivetti Philoss Quaderno

Distributor: Olivetti
Telephone: (02) 748 3390
Price: $3495
Specifications: AMD 386SXLV/20 CPU, 4M of standard RAM, expandable to 12M, PCMCIA slot, built-in mic and speaker, monochrome LCD display

combinations for accessing a host of inbuilt ROM utilities, and organiser functions. With an inbuilt trackball, the only compromise is size, which can make extended text entry frustrating.

The machine itself is packed with features only found on much larger notebooks. Network or modem connection is made possible via a PCMCIA slot, with micro connections for I/O ports, keyboard and external CRT. The parallel printer port is also used for connection to an external floppy.

One of the more innovative features is the built-in sound chip and voice processing software. With the appropriate controls, and the microphone and speaker (microphone and headphone sockets are also included) on the outside of the case, the machine can be used as a tape recorder, and varying levels of compression can be used before writing the digitised speech to the hard drive (up to 10 minutes a megabyte).

Combined with a lightweight 1700mAh NiCad battery, the Quaderno lasted two hours, 26 minutes on our rundown tests. The power management features are easily accessed via hotkey combinations and with a removable battery, extended time on the road is possible.

Shipped with a 12-month warranty, Microsoft Works and Lotus Organiser, the Quaderno is ready for action. Limited in use by its size, it is ideal for use as a personal organiser or to access information that would otherwise be left on the office computer or network.

Panasonic CF1000

By Ben Gerholt

The Panasonic CF1000 is a slim unit that ingeniously allows its 3.5in floppy drive to be removed and replaced by a second battery, doubling its life away from the socket.

While the unit is lightweight and offers extra versatility, thanks to its second battery/floppy drive slot, it is not a solid unit and the design of removable devices is poor. To remove the floppy drive I had to put the machine on its edge, an awkward process that designers should be able to iron out. I wouldn't have minded this so much if the slide clips had actually worked properly. The identical clip holding the main battery failed to keep the battery connected — something I found out after running the battery drain tests and leaving the machine to charge up so I could play with it on the train home. This is a serious fault that should not occur in any machine.

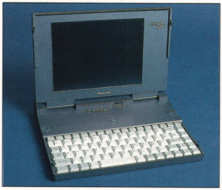
The second battery in place of the floppy drive is a great idea — most people don't need floppies on the road, but would prefer the convenience of the extra battery power. Of course, nothing is free in this world — the extra battery is an option that takes the price of the unit from $4299 to $4699. To buy the battery separately costs $449.

Most ports — expansion bus, parallel, serial and VGA — are located at the rear, but the external power supply and external keyboard/mouse ports are on the side. An optional docking unit is available that will allow a 16-bit and an 8-bit ISA card. There is no PCMCIA slot on the CF1000, but Panasonic has an $699 internal 9600bps fax modem as an option. The fax is send only, and comes with WinFax Lite software.

Perhaps the strongest single feature of the CF1000 is the 86-key keyboard. It is extremely sturdy — there is no give at all; the keys are soft touch and have medium travel — and one of the best keyboards of the test group. Surprisingly, a pointing device was not included with the unit. The Sharp backlit LCD display provides crisp video, and the power pack is one of the smallest (and lightest) units provided with the test machines.

The setup program, 'SETUP1K' in the manual but 'SETUP1KA' in reality, allows the system, video, security and power management to be configured. It also has a battery charge display. Power management allows the CPU, hard disk, LCD and system timed shutdowns to be set. There are default settings for 'super long life', 'long life' and 'high performance', or users can configure their own settings.

Panasonic pre-installs Superstor on the 80M hard drive, boosting its capacity to 150M. For the benchmark tests we didn't remove Superstor, as most purchasers would opt to stay with the preinstalled configuration, making benchmark figures with Superstor present far more relevant. Disk tests (and following from that the DOSMark) produced poor results due to this. The DOSMark (14.15) is the lowest score of the test group and 36 per cent below average. Disk harmonic is 14.18 or 38 per cent below the average result, but the Disk WinMark (23585) is surprisingly good, only one per cent below average and ranked 17th. A 170M hard drive version of the CF1000 that does not include Superstor and is packaged with DOS 6.0 instead of DOS 5.0, is due for release in time for Christmas.



Lightweight and slim, the Panasonic CF1000 has a Sharp backlit LCD display. Best feature: its sturdy keyboard

AT A GLANCE

Panasonic CF1000

Distributor:	Panasonic Australia
Telephone:	(02) 986 7400
Price:	$4299
Specifications:	Cyrix 25MHz 486SLC chip, 4M of RAM, expandable to 12M, 80M hard disk, monochrome backlit LCD display.

We have left these Superstor-influenced results in our summary for reader interest, because we believe they provide an accurate indication of off-the-shelf performance for the end user compared with the other notebooks we evaluated. Obviously, the compression should be taken into account with your comparisons.

Lacklustre benchmark results continue due to the 486SLC/25 chip. The 3728.59 Processor harmonic is a full 40 per cent worse than the average machine, and the video scores — Video harmonic of 2418.22 and Graphic WinMark of 2.36 megapixels per second — are respectively 23 and 32 per cent below average results.

What on paper appears to be a promising machine for the $4299 price tag proves to be a lower performer. However, this notebook is lightweight, slim and offers the convenience of a second battery and removable floppy drive.

Pearl 65M/66

By David Lin

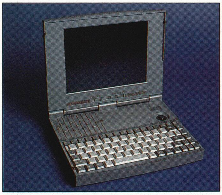
This model is one of a series of notebooks called the 65 line that encompasses 12 models of 486 SX, DX and DX2 computers in monochrome, passive and active matrix colour configurations. The 65M/66 is the company's 66MHz DX2 mono version with a 120M Conner CP2124 hard disk and 4M RAM upgradable to 8 or 20M using proprietary memory cards mounted through a trapdoor in the underside. Other internal components consist of two PCMCIA Type II slots situated on the left side; a built-in trackball; Award BIOS; and VESA local bus implementations for the IDE drive controller and display adaptor.

Outwardly, there is hardly a distinguishing characteristic. The case has a black finish with not even a brand name logo for embellishment. The PCMCIA slots and removable battery pack occupy the left side. The right is taken up by the 3.5in floppy, trackball buttons and, due to the nature of the processor, a dedicated fan outlet for cooling the CPU. At the rear are the I/O ports for keyboard, VGA monitor, parallel and serial and a docking station.

Unclasping the two-hinged display panel reveals a conventional 85-key keyboard and a bevy of LEDs. A panel on the top side slides off for easy access to the Conner drive. A cynic might also say that the hatch had an alternative purpose in allowing easy ventilation for the CPU, which is in plain view within the cavity alongside the hard disk. Nevertheless, we cannot make these assumptions, and the 65M/66 proved reliable during its sojourn with us.

The only software that came in the box was a utilities diskette containing the PCMCIA, trackball and Appian local bus IDE drivers, although as specified for this review, DOS 6.0 and Windows were supplied on the hard disk. Two manuals were also provided, a general user manual and a slimmer volume for the utilities.

Pardon the pun, but we anticipated this machine to be a real pearl in the performance stakes by virtue of its clock-doubled processor. In fact, the 65M/66 tipped its hat in the DOSMark scores to four other machines, all with lower processor credentials. In effect, *APC's* testing has reflected findings from a similar comparison of notebooks in the US where those manufacturers who have taken a holistic approach to their designs have come up trumps. Just having the CPU on board is not the be all and end all in designing for performance; a totally engineered machine will take the cake.



The Pearl 65M/66 has two PCMCIA slots and a removable battery pack. Best feature: its raw computing power

The Processor harmonic benchmark saw the 65M/66 in third place behind the outstanding engineering of the TI Travelmate, a DX2/50, and the Futura Sphere, another DX2/66. In the memory subsystem the Pearl was fifth, the top five positions in a class of their own with daylight between these elite machines and the rest. The disappointment would have to be in the disk and video subsystems, which should have gained the benefit of 32-bit access to the CPU. The Appian IDE driver is a good performer, but only managed 11th position on the 65M/66, while the Cirrus Logic chipset for the display adaptor was a poor 18th position. In Windows, the situation was improved, although again there was an oversight in not providing video drivers. Still, using the standard VGA driver provided by Microsoft, the Pearl still managed a sterling 5.6 million WinMarks, which is a score that many desktop systems, DX2/66 or otherwise, would be proud of claiming.

In spite of the disadvantage of a DX2 CPU, Pearl has produced a battery power miser. Our rundown test saw a remarkable two hours, 44 minutes life from the NiCad battery with all power management disabled. Having a mono VGA display played its part in keeping the machine running with a minimum of expended energy, and with the reinforcement of the disk, display and suspend/resume features you would think this machine is for the power user on the road. In my opinion, the answer is not quite. We had some difficulty viewing the LCD display, and this was not any prejudice on the part of a colour-holic. Constant adjustment of the brightness and contrast controls, which were not very responsive, and prominent 'ghosting' in both DOS and Windows applications, made life frustrating. The keyboard was good but the trackball, whether it was a result of the 'ghosting' or poor calibration, had a tendency to over track cursor movement.

There are pluses and minuses for the Pearl 65M/66. Providing dual PCMCIA slots is a concession to the future, and a built-in pointing device is always welcome for the GUI user. The power supply is a largish unit that proved inconvenient in travel, which makes the prospect of purchasing an extra battery pack attractive. Upgrading memory through proprietary cards is a painful exercise for the hip pocket from past experience and the option of increments of only 8 or 20M is inflexible. The best news is the optional docking station, which is a smart-looking unit holding four ISA slots, a 5.25in drive bay, speakers for multimedia application and a built-in SCSI host adaptor. Armed so, you would expect even the most hardened power user could live happily within such constraints.

AT A GLANCE

Pearl 65M/66

Distributor:	Pearl Computer
Telephone:	(02) 440 8855
Price:	$4399
Specifications:	Intel 66MHz 486DX2 CPU, 4M of standard RAM expandable to 20M, 120M hard disk, two PCMCIA slots, monochrome display.

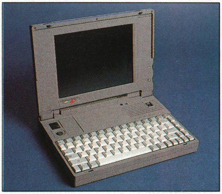
Priced at $4399 the Pearl 65M/66 is a good buy for the ambitious user who can do without the fancy graphical hoo ha when not plugged into a CRT monitor, but can't do without the raw computing power in a portable PC.

Renard X483 Series

Renard B485

By Stuart Bowman

This company has a laptop to match your every want and need — with 10in screens ranging from mono LCD to passive and active matrix colour, and hard drives from 80 to 200M. If you're looking for something smaller, they also have a range of subnotes, starting with the B485: a 1.7kg B5-sized notebook.



The Renard X483CT features an active matrix colour display. Best feature: 10in screen

While the laptop machines were all equipped with 486SLC and 487 coprocessors running at 33MHz, the X483CT (active matrix colour) was fastest followed by the X483 (monochrome). The above-average Disk harmonic of 27.16 helped raise the DOSMark to 22.13, which was one per cent above average. This disk performance carried through to the Windows tests with a score of 25157, or five per cent above average. When running the Windows Graphic tests, the X483C (passive matrix) came out in front with a rate of 1.83 megapixels per second, compared with 1.69 and 1.63 for the X483CT and X483.

At $3255, the X483 is a budget entry-level laptop. While there is nothing spectacular about the mono LCD screen, it does avoid the problem of ghosting that plagues many of the cheaper laptop displays. The

Apple Macintosh PowerBook Series

BY DAN TEBBUTT

With a substantial slice of the market — something between 20 and 25 per cent — the Apple Macintosh PowerBook range has deserved in the past to be the leader of the mobile computing ratpack. Solid machines based on the Macintosh operating environment, they represent the logical choice for the many business users with desktop Mac systems, and equally for first-time mobile computing workers. Their light weight, inbuilt trackballs, restpads and networking, Austel-approved and available internal modems, and their ahead-of-time active matrix mono screens meant that even non-Macophiles flocked to them.

That's not to say that the PowerBook could not be improved. Most of the advantages have been whittled to insignificance in the last six months, with active-matrix colour, Windows-happy notebooks now popular, complete with native networking, reasonable trackballs and internal modems — for a price.

For those familiar with more conventional notebook layouts, the positioning of the keyboard against the screen rather than closest to the user may seem at first uncomfortable. This ought not present problems for touch-typists, though others (such as I) may experience some frustration. Despite my feelings, the palm rests have proved popular, especially for those working on airline tray tables or other environments with little space.

The PowerBook keyboard itself is sturdy and comfortable, though the addition of function keys would make life happier for users who run QuicKeys and customised application keystroke controls.

Another problem, this time nothing particular to the PowerBook, is the trackball, still an awkward substitute for the mouse. Opinion as to whether the mouse-position, between the keyboard and the user, is better or worse that a detachable side-mounted mouse is largely subjective.

An eminently superior feature of the PowerBook, derived from the Apple desktop range, is the inclusion of inbuilt networking. It defeats me how many notebook manufacturers can still believe that any computer these days, most of all a portable, should not contain networking capabilities as an integral feature. Fads may come and go, but the LAN and WAN are the workplace standards of this decade — and growing. Apple has strongly recognised this need, so connecting a PowerBook to a network is a simple as plugging an AppleTalk cable in the back and logging on — simple, and well appreciated by Mac users.

Apple has recently released several new laptops to replace its current standard-bearers, including passive matrix colour models. The PowerBook 160, aimed at the general laptop user, is a 25MHz machine, based on the Motorola 68030 processor. It comes with 4M RAM (expandable to 14M) and 40M hard drive as standard, which is ample for word processing, though may run a bit dry in attempting large spreadsheet or database work. For such requirements, you may like to examine the PowerBook 180, coming with similar RAM specifications, but a more sizeable hard drive and the welcome inclusion of a 33MHz 68882 coprocessor to expedite calculation-intensive applications.

Unfortunately, *APC* was only provided with an older model PowerBook 170 to examine, so we cannot comment in depth on improvements in performance among the new batch.

Another flagship of the PowerBook range is the PowerBook Duo, an extremely lightweight (1.9kg) portable that can be easily slid into a DuoDock, and voila, your desktop system — no reconfiguring, no wiring, no disk synchronisations. Though Duo sales are widely known to be slower than Apple hoped, the concept is a useful one and should, eventually, make inroads into the corporate sector as a compromise for the desire to have a highly-powered desktop with a conveniently integrated portable.

Unlike traditional docking stations, the Duo uses a cassette recorder-style mechanism to 'grab' the notebook from the user and lock it in place.

The lifespan of the PowerBook's battery is disappointingly short, though it does recharge quickly. One hint for Apple: the power cable for the laptop is way too short, which means that one often has to sit in awkward positions to use the PowerBook with a live power source.

Nonetheless, the PowerBook range offers fine computers for the mobile user. They could do with a little more thought put into marginal features that make a good computer a great computer. Gone are the days when even Mac enthusiasts (among whom I number myself) would merely buy because of the Apple logo. In a buyers' market, value for money, ease of use and reliability are crucial factors, and the Apple Macintosh PowerBook scores well on the last two, but could be improved on the first.

active matrix screen is only marginally better than its passive matrix counterpart, so it is best here to settle for the passive matrix display ($5030) instead of paying the extra for the active matrix display ($6496).

The internal trackball comes as an optional extra. It has buttons on both the top and sides, making it easy for both left and right-handers to operate. Although the machine has no PCMCIA slots, there is an internal SCSI port and the option of either a docking station or expansion chassis.

The X483, with its APM disabled, lasted for two hours 11 minutes, considerably longer than the X483CT, which lasted only one hour 29 minutes.

If it is a subnote that you are after then the Gempower B485 is an ideal machine. Weighing 1.7kg, this machine can go anywhere and connect to just about anything. An omission on just about every other laptop, the B485 includes two PCMCIA Type II slots. This extra addition is made possible by using an external floppy drive. The keyboard is another exceptional feature, with a standard layout, inverted T cursor keys and built-in trackball. It is easy to use and unlike most subnotebooks, comfortable to type on.

The big sacrifice here is not features but speed — with a 25MHz 486SLC processor the performance hit is noticeable. The DOSMark of 16.22 is 26 per cent below average, with a Windows DiskMark of 18077 and Graphics rate of 1.95 megapixels per second, which are 25 and 44 per cent below average. As a result of the slower processor and 21.7cm monochrome backlit LCD screen, the raw battery rundown lasted for just over three hours, which was 50 per cent above average.

The screen supports 64 shades of grey and has minimal ghosting, and an external display of 1024 by 768 with 256 colours. For $3564, the B485 comes equipped with an 80M hard disk and 4M of RAM expandable to 20M.

The Renard S483 lies somewhere be-

Aren't critics paid to criticise? PC Magazine said 'top performer on all benchmark tests.' 1993.

Others rave of our value for money, PC World voted our notebooks 'Best Buy,' 1992.

Choose what the experts choose. Australian Personal Computer gave our notebooks 'Editors Choice,' 1993.

We're not new to Australia, we've been working, researching and servicing here for 34 years.

We're not new to computing, we actually invented the chip.

The Whole Point Of Our New Notebooks Working Faster, Is So You Can Work Faster.

Irrefutably, they're fast.

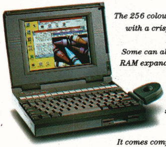
The world's fastest, in fact. Our DX2/50MHz with inbuilt maths coprocessor chip is the fastest chip in a notebook, in the world.

Each of our new range is 486 powered, but unlike any other 486 they innovatively run with just 3.3 volts, so their battery life is far longer than its 6 volt competitors. They test up to a battery life of 5 hours and beyond. And they stay a lot cooler.

Another technical advantage is their Window Optimised Bios which powers up the on board Windows 3.1 in less than 30 seconds.

All this power with up to 200Mb of hard disk and choice of colour screen in a package that tips in under 3kg makes them perfect for architects, builders, accountants, engineers, financiers, scientists, and other big users of high power CAD or graphics applications.

To find out just which of our 7 new 486 notebooks is best for you, call Sydney on 910 3100, Melbourne on 696 1211, or toll free 008 024 853. Or if you're too busy to call, post.



Windows 3.1 and MS-DOS 5.0 are already installed and optimised.

The 256 colour screen is VGA with a crisp 640 x 480.

Some can also come with RAM expandable to 20Mb.

It runs at 3.3 volts not 6 volts so it runs cooler.

It comes complete with an ultra accurate Microsoft BallPoint.

Its special monocoque construction means it'll stand a shock of 5G.

Our TravelMate 4000E WinDX2/50 comes with a hard disk of 200Mb.

Battery Pro software prolongs battery life up to 5 hours and beyond.

TEXAS INSTRUMENTS

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Sydney. Locked Bag 15, North Ryde, New South Wales 2113.

EXTENDING YOUR REACH WITH INNOVATION™

The Renard Gempower B485 subnotebook is based on the Cyrix 486SLC chip with 25MHz 487 coprocessor. Best features: bundled extras such as PCMCIA slots and quality keyboard

tween a subnote and a laptop. At 2.3kg it is heavier than the B485. While it lacks many of the features of the smaller note, it does have a larger 24cm mono display, internal floppy drive, near full-size keyboard and uses a more powerful 486SLC 33MHz processor.

With the increase in processor speed, the machine comes in with a DOSMark of 17.6, which is 20 per cent below average, and a Disk WinMark of 19703 and Graphics rate of 2.48 megapixels per second — 18 and 29 per cent below average.

As with the other machines in the Renard range, the power management is via the CMOS at setup, and with the APM disabled the battery lasted a below-average one hour 53 minutes.

The keys are very 'plasticy', with a deft clicky feel to them as if they are in mid-travel and stopped abruptly. The half-size function keys are grouped in two rows at the top right hand end of the keyboard.

When compared to either the subnotebook or the other notebooks that Renard has to offer, the S483 is the cheapest machine ($3204), but unfortunately it is not a good compromise between performance/features and size, and one would be better off paying the extra money for the more powerful notebooks or increased portability and expendability of the subnotebook.

All the machines come with a two-year warranty (three years for repeat purchases) and by sending in your warranty card you receive a free portfolio bag for your laptop. Toll free service operates for extended hours between 7:30 am to 10:30pm and offers weekend support.

AT A GLANCE

Renard X483 Series

Distributor: Veridata Australia
Telephone: 008 814 817
Prices: X483, $3255;
X483C; $5030;
X483CT, $6496;
S483, $3204.

Specifications: Cyrix 486SLC Chip with 33MHz 487 coprocessors. 4M of standard RAM expandable to 16M for all machines except S483, which has 2M of RAM expandable to 18M. Hard disk sizes are 80M for all units except X483CT, which as 120M. Screen types range from mono (S483 and X483), passive-matrix colour (X483C), active matrix colour (X483CT).

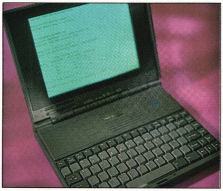
Renard B485

Distributor: Veridata Australia
Telephone: 008 814 817
Price: $3204
Specifications: Cyrix 486SLC with 25MHz 487 coprocessor, 4M of RAM expandable to 20M, 80M hard disk, two Type II PCMCIA slots, mono backlit LCD display.

Sharp PC-7750

By Jeremy White

Sharp has a good reputation for consumer electronics, and its skills are carried over well to its notebooks, especially screen technology, in which Sharp is a pioneer. Sharp developed the dual-scan passive matrix displays used on notebooks like the Contura 4/25C, and was the screen manufacturer for nearly half of the notebooks in our survey. These ranged from low-end machines such as the Renards, through to the brilliant 256 colour active matrix screen on the TI TravelMate DX2/50.



The Sharp PC-7750 is small, rugged and lightweight. Best features: quality design and good performance, especially under Windows

AT A GLANCE

Sharp PC-7750

Distributor: Sharp
Telephone: (02) 831 9111
Price: $5795
Specifications: Intel 33MHz 486DX CPU, 4M of standard RAM expandable to 20M, 124M hard disk, 10in monochrome backlit LCD display.

Two new high-end Sharp notebooks are due for release by the time you read this, both weighing around 2.7kg, and based on Intel's 486SL/33 chip — the same used in the NEC and Compaq high-end units in this review. While these won't include 3.3-volt screen technology, one will have a 9in dual-scan passive matrix display, and the other an 8.4in active matrix display. The company is currently working on large 9.5in low-consumption 3.3-volt displays.

Both notebooks will include an ExCA-compliant (Exchangeable Card Architecture) PCMCIA Type II slot, allowing users to hot-switch between different cards.

For this review, we examined the PC-7750 notebook. The PC-7750 uses a full Intel 486DX/33. The PC-7750 is housed in a sturdy, business-like dark grey case, with a thin lid and a low unobtrusive profile. Sharp's consumer experience is clear — its notebooks are small, light, and rugged, and from experience can take substantial person-handling without hiccup.

Even with the large 10in screen, the PC-7750 is still one of the smallest in our survey, and is also light, weighing just 2.7kg. It looks and feels durable though, and there is none of the structural flexibility (literally) we saw in many of the clones in this survey.

An internal trackball is optional, but recommended, and is positioned above the keyboard on the left. The backplane includes a docking station expansion port, serial and high-speed parallel ports, and PS/2 keyboard port, but unless you choose the internal trackball option you will need either to use a serial port for an external mouse, or an optional double-adaptor for the keyboard port. There is also an internal modem bay, with a cut-out slot on the back left-hand side of the case.

True to Sharp's reputation, the 10in 64-level greyscale backlit supertwist screen is crisp for its class, and has little or no ghosting, although its brightness increases almost imperceptibly the longer the notebook is in use. While it doesn't compare to the active matrix colour version, it is easy to see why the Sharp screens are popular with other manufacturers, even at the low-end of the market.

The use of full versions of the Intel chipsets has an impact on battery performance, which for the PC-7750 scored just below average in our rundown tests at one hour, 55 minutes. The Nickel Metal Hydride version of the battery is rated for 2.5 hours, which with power-management enabled was a conservative reflection of real-usage, which I've found to be generally closer to three hours.

The PC-7750 can become quite warm after extended periods thanks to its 33MHz engine, although not so hot to the touch as to be of concern. The new releases should see raw battery life between two and three hours, even with colour displays, and reduce the heat-buildup, using the low-power consumption Intel 486SL/33 chipset.

Power management for the PC-7750 is controlled from both DOS and Windows utilities. There is auto-rest after a customisable period, and the hard drive and screen are powered down after user-specified durations of inactivity. Auto-resume is also supported, allowing the user to drop down the screen and open where they left off. There is also a manually-activated suspend mode.

The keyboard is responsive, with a low profile and decent travel. If anything it is too responsive, and tends to double characters if you're a hunt-and-pecker like myself, so it's wise to check that it suits your typing style. The cursor controls are in an inverted T at the bottom right of the keyboard, with Insert and Delete in the top right.

Performance for the Sharp PC-7750 was in keeping with its mid-level target market, falling a fraction behind the IBM ThinkPad 720C.

The only poor showing for the Sharp was DOS Video performance, where it ranked 33rd. This was surprising considering the 256K of video RAM, although the Cirrus Logic chipset may be better suited to Windows than DOS, as here the PC-7750 scored a respectable 22nd with 2.7 megapixels per second.

The performance of the 124M Toshiba MK2124FC IDE hard disk with 32K buffer was 16 per cent below average, at 19.15, although again Windows performance was much better, rating 15th and five per cent above average with a score of 25140.

Processor performance from the Intel 486DX/33 was very good, eighth overall and 25 per cent above average, interestingly just ahead of Compaq's 4/33C, and the memory subsystem was also strong. The DOSMark was pegged back by drive and video performance, however, to a respectable 21.20, making this generally a better Windows than DOS performer.

External VGA and simultaneous display are supported, and you can close the case and use an external keyboard, mouse and monitor, making this an adequate desktop replacement. Sharp offers a good shoulder carry bag, with pockets for additional cabling and connectors, papers, and enough room to carry an external modem and mouse.

Overall, the Sharp PC-7750, which retails for $5795, combines good structure and design, a quality display and reasonable to good performance, particularly under Windows.

APC has been using 486SX/25 PC-7700s as mobile test units since June, and despite the hammering they've received, they have performed without fault. Sharp's notebook families are durable, portable, and perform well.

Sphere Futura Series

By Stuart Bowman

These machines are fast and attractive. Equipped with Intel's clock-doubled 80486DX2/66 processors, screaming benchmark results and 24cm screens, there is no stopping them. The immediate question for our test team, however, was whether a clone manufacturer can successfully stick a 66MHz chip in a notebook, without risking the China Syndrome.

Many of the local assemblers and lesser known manufacturers have gone for raw power and lower prices in an attempt to thwart the market dominance of NEC, TI, Toshiba and Compaq. This has made for an amusing clash, and it's been interesting to see to what extent design and engineering have effected performance results.

The Sphere family came off fairly well, holding two of the top five places overall in our relative benchmark projections.

There is more to a great notebook than screaming speed though — battery life, weight, aesthetics and heat build-up become critical. You also expect 66MHz-based machines to outperform units with half the clock speed. It may be telling that the theoretically slower TI TravelMate 4000E DX2/50 managed to outperform the Sphere, and that the NEC Versa/33C was not far behind.

The Sphere Futura 486DX2/66 colour notebook has a crisp and bright active matrix colour display. Best feature: top performance results

AT A GLANCE

Sphere Futura Series

Distributor: Sphere Business Systems
Telephone: (03) 523 5511
Prices: $4078 (mono); $8590 (colour).
Specifications: Intel 66MHz 486DX2 CPU, 4M of standard RAM, expandable to 32M, 200M hard disk (colour version), 120M hard disk (mono version), two Type II or one Type III PCMCIA slots, monochrome LCD display, and active matrix display on colour version.

You should also consider why the name brand notebook pioneers have not been game to go to full 66MHz 486DX chips in notebooks to this point, and why it took even a determined TI months of research and development before moving even to a 50MHz chipset.

Two Sphere models were provided for review, the active matrix Sphere Futura Colour ($8590) with a 200M hard disk, and the monochrome ($4078) with a smaller 120M hard drive and slower disk subsystem. Both machines are the same size: a chunky 28.2 by 21.8 by 5.1cm, the colour model being slightly heavier at 3.19kg.

In performance tests, the colour machine proved faster and second fastest overall. Its DOSMark of 29.42 is 34 per cent above average, while the Disk WinMark score of 37100 put it 55 per cent above the average, and Windows graphics score came in at 7.07 megapixels per second, which is a huge 103 per cent above average. For the monochrome model, the DOSMark is a little lower, at 27.75. The Windows Disk score came in at 26862, or 12 per cent above the average, and a Windows Graphics of 7.04 megapixels per second is almost identical to the active matrix machine.

One major drawback with these machines is that the power management features are only accessible at bootup via the CMOS, an open invitation for disaster. It is here that you start to see that design differences become important.

In rundown tests, the monochrome model lasted for two hours and eight minutes, which was five minutes longer than its coloured sibling, a mammoth effort considering such a power-hungry processor. The clock-doubled chip is also known for high operating temperatures, and to combat this there is a small fan installed on the side of the unit. That's right, a notebook with a fan. The fan is controlled by a thermostat, operating only during intensive CPU periods. When it kicks in, it must eat into battery life significantly.

There is more expansion here than you can poke a PCMCIA card into — with two Type II or one Type III slots, the machine is easily connected to a network or modem. If this isn't enough, then there is also the optional expansion port chassis, ideal if you wish to replace a desk-based machine.

In most aspects this machine is a pleasure to use. The trackball is firm yet responsive and sensibly located on a handy wrist rest. While the display on the monochrome machine is only average, the active matrix colour is bright and crisp and viewable from most angles and in any lighting condition.

There were four DX2/66-based machines submitted for review, and often these clock-doubled machines were surpassed in performance by optimised 33MHz processors, while the Texas Instruments DX2-50 was fastest overall.

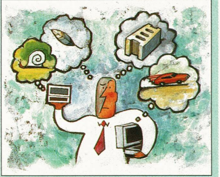
It becomes obvious that design and system optimisation are more important than raw processing power. Unfortunately, the Futura is let down by its lack of high-end features, such as power-management. It also falls behind for its upgradability and userability when compared to similarly-priced machines.

This becomes obvious when trying to find out the remaining battery charge or changing power management parameters. While we were unable to define any specific system degradation due to the high-operating temperatures of the DX2/66 chip, we also feel that there must be long-term reliability concerns pushing technology this way — unless Sphere has acquired engineering teams capable of outclassing the most talented and well resourced in the world.

While the 12-month warranty is standard, one would hope that for this sort of investment a longer warranty would be offered. Still, even with our concerns, from both a price and performance point of view, this machine is a real winner, particularly so for the mono version.

Preview: Toshiba's new T1950CS

Toshiba has just released a new machine in its T1900 series, the T1950CS. While the release of the unit was too late for inclusion in the notebook testing, *APC* did get a preview of the unit. At $4500 ex-tax for (or retail at around $5600) the base model, the machine promises greater performance, more standard disk space and the new 'ergonomic' Microsoft ballpoint mouse.



There are a series of options for the new machine. The base model comes with a 200M drive and option of a monochrome, dual-scan passive matrix screen or a TFT Active Matrix colour screen. The hard drive can also be upgraded to a 320M unit.

To give the machine the performance notebooks of today require, Toshiba chose the 3.3-volt 486SL/DX2 40MHz processor. The SL chip is designed for high performance, but low battery drain. The top of the line active matrix unit will have 1M of VRAM installed, while a feature standard in all units is auto standby and resume when the lid is closed.

Aside from these factors, the unit is identical to the T1900 machine. An expansion bus is not included and parallel, serial and VGA ports are located on the rear of the unit. There is one Type III PCMCIA slot and ports for an external keyboard and mouse.

The new Microsoft ballpoint mouse has been bundled with this unit. This new, more ergonomic, pointing device (see First Looks, November 1993 *APC*) is attached via a QuickPort connector. It features improved button control — button 1 is operated with the index finger, while button 2 is operated with the thumb. The trackball itself also seems to be more precise — there is no slack.

Overall, this unit promises the long lasting quality of Toshiba portables with the improved performance of the SL DX2/40 processor. The extra VRAM on the TFT active matrix colour unit promises far improved performance, especially for Windows-based application. The unit comes standard with 4M of RAM, but Toshiba memory cards are available to expand that to 20M. It would certainly be a great bonus even just adding a 4M card to raise the RAM level to 8M.

Texas Instruments TravelMate 4000E 486DX2/50

TravelMate 4000E 486SX/25

By Dan Tebbutt

The Texas Instruments range of notebooks are fast gaining a reputation as fine machines, and the two TravelMate 4000Es that *APC* examined prove this to be more than marketing hubris. As the accompanying charts and tables show, the TravelMate 486DX2/50 was rated the best of all notebooks reviewed on a cumulative comparison. This result is just reward for a fine piece of machinery that would send any notebook user 16 shades of green with envy.

The 25MHz 486SX-based TI TravelMate 4000E has a 256-colour passive matrix screen. Best feature: superior performance and power in its class

TI uses an unusual case design for its TravelMates, where the components, such as the hard drive, are used to form the case structure. This engineering method makes for extremely low weight using full-capability componentry, and this is how the company has managed to keep a 486DX2/50-based notebook with 200M hard drive and full 256-colour, active-matrix display well under 3kg.

The high-end version is based on the Intel 486DX2/50 chip with 8K of external processor cache. This, combined with a full 32-bit data path, local bus video and 1M of 60ns video RAM, with 20M of system RAM, made the TI perform like a veritable rocket, putting many a 486 desktop to shame.

The Sharp 8.4in 256 colour active-matrix display was a pleasure to work on, and

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Adelaide SA 5000
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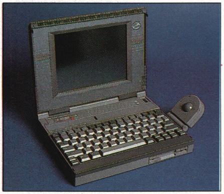
again would cause many a user to query whether a desktop would not be rendered redundant by its purchase. External simultaneous display at up to 1024 by 768 in 16 colours is also supported.

Upon collecting the laptop from *APC* test labs, I was confronted with the first horror of mobile computing . . . rain. At least if your paper-filled briefcase gets wet you only lose the information (or part of it), not several grand's worth of technology as well. TI offers a range of stylish practical carry-cases that, unfortunately, were not provided with the review machines, but we've seen them before, and starting from $70 are well worth the extra expense.

Weighing in at a remarkable 2.8kg and with dimensions of 21.6 by 27.9 by 5.3cm, this roving workhorse topped our Labs' tests in the DOSMark (49 per cent above average), Processor (104 per cent above) and Disk WinMark (63 per cent above) categories and really leaves little left to be asked of it. The DX2 also scored strongly on the Memory and Disk benchmarks. All in all, a very solid investment that is unlikely to disappoint many users who are ready to invest in a serious piece of portable hardware.



The TI TravelMate 4000E 486DX2/50 features a Sharp 8.4in 256-colour active matrix display. Best features: its speed and power and superb engineering

Although only a 486SX, clocking up a *mere* 25MHz, with performance noticeably below the DX2, the $4000-cheaper TravelMate 486SX is a very satisfactory alternative for those who do not require ultra-high-powered machines — and, much as we don't like to admit it, that's still arguably the majority of the market.

The SX has a near-identical form to the DX2, but as well as the slower chip, uses a 256-colour passive-matrix monitor. This is, though, still a laptop with enough grunt to recommend itself to the roving operator. While slightly lighter, its dimensions are identical to those of its elder sibling, and it comes with an ample 120M hard disk (compared to the DX2's 200M). The SX scored best on the Graphic WinMark and Processor measures, and performed above average with its Video; its overall ranking of 17th was commendable for an SX, allowing for the power advantage of many of its classmates.

Several US observers have commented that while the TravelMates may appear on paper to be much the same as most other 486s, their actual performance proved superior due to a fully optimised architecture, including speedy 32-bit video bus charged with VRAM, 8K caching and a fine-tuned preloaded Windows setup, and this was born out by the DX2 model's performance, where it outstripped DX2/66 machines.

TI bundles with its notebooks some of its own utilities, which are designed to enhance laptop functionality, and would be particularly helpful for the novice Windows user. While initially annoyed with these 'intruders', I actually found myself returning to a couple of them after a few days' use — so I raise my glass of cynicism Texasward for these additions.

Both keyboards are suitably sensitive and ideally sized for a portable, especially for those who touch-type. Clod fingers that I am, I would argue that the backslash key was too small, which proved painful in DOS commands when a backspace or Enter appeared. Although the Fn-keys are similarly small, they did not seem to present the same problem. Unfortunately, experience with the 486DX2 (which had a broken Delete key and the floppy disk cover fell off) would suggest some reservations about the peripheral sturdiness of the TravelMates, despite the integrated casing design.

Neither of these models featured PCMCIA slots. This may or may not be a problem depending on individual inclination, but with no users who we've contacted able to obtain shipped Austel-approved internal modems that fit the TI, and the convenience offered by PCMCIA network adaptor cards, it's an addition the TIs could use, especially at their prices.

AT A GLANCE

TI TravelMate 4000E 486DX2/50

Distributor: Texas Instruments
Telephone: (02) 910 3100
Price: $9232
Specifications: Intel 50MHz 486DX2 CPU, 4M of standard RAM expandable to 20M, 200M hard disk, active-matrix colour display.

TI TravelMate 4000E 486SX/25

Distributor: Texas Instruments
Telephone: (02) 910 3100
Price: $5188
Specifications: Intel 25MHz 486SX CPU, 4M of standard RAM expandable to 20M, 120M hard disk, passive-matrix colour display.

The usual gripe about the short life of the battery is as applicable to the TravelMates as any other notebook. Although supporting documentation does not state it, I experienced a shorter battery life from the DX2 than SX, which would be expected from the differences in display and processor power: the efficiency-obsessed might argue that the extra processor speed allows more work to be done in the shorter battery life. I also remarked considerable performance difference between working off a power cable and internal battery due to the intelligence of the power management, which cuts down processing on as micro a scale as between keystrokes — a variation of the dilemma of performance vs portability.

It must be conceded that the problem TI faces here is not unique. The notebook does come with the best of a bad lot in TI's BatteryPro power manager, which conforms to Microsoft's Advanced Power Management (APM) specification.

An internal 3.5in disk drive is fitted nearest the user, which may prove a little awkward when working is very tight corners. Even the 120M hard disk provided on the SX/25 ought to be adequate for mobile computing. Preinstalled with Windows 3.1 and MS-DOS, the addition of MS Word, Excel and CPS PC Tools left around 70M free, and there's always DoubleSpace or Stacker.

A detachable Microsoft BallPoint with QuickPort Connector trackball connects to the right-hand side. Like many I talk to, I find trackballs rather fiddly and annoying, but the hot snap-on design and robustness of this model ranks it as one of the best. I find though, that it's better to take time to learn keystroke combinations as a more convenient method of application control. Perhaps the IBM ThinkPad TrackPoint II provides a more suitable alternative to this integral part of the graphical user interface.

One concern I found in using the TravelMate on trains and buses is that the screen section tends to flop about. More than merely distracting, this worried me about the strength of the machine, despite TI's excellent reputation in this regard — a thought not helped by the fact keys had come off the review unit, and the expansion port cover kept falling off.

Tucked neatly into the left-hand side were several ports: a printer port, monitor port, mouse connector and modem port.

The speed and power of both machines,

but especially the DX2, are much to be admired. To consistently top the performance stakes in our benchmarks required the TI to beat units based on DX2/66-based machines, and the fact that it was able to is an indication of how well put together is this machine. For practicality, both notebooks were perfectly comfortable running large WinWord and Excel files together, on top of a PC Tools Windows desktop manager.

The benchmark results evidence well-architectured machines that are unlikely to betray purchasers. All in all, the TI TravelMates are solid performers and well adapted to the rigours of mobile computing, and despite some doubts in my mind as to external aspects of their physical durability, they can be strongly recommended on both objective and subjective grounds.

Toshiba T1900C

Toshiba T4600C

Toshiba T6600C

By Ben Gerholt

Toshiba has long been known as one of the prime providers of portable computing products. The company's machines are generally good performers and of a solid build. Toshiba's machines are all of a similar design, but vary widely in features and price. Surprisingly, in benchmark testing the machines did not rank as highly as their reputations and specifications would have suggested. The company is introducing a new machine, however, engineered with a greater emphasis on performance — the T1950/CS (see separate review on page 50). This unit combines a higher processor with improved graphics performance and increased hard disk options for the 1900 series.

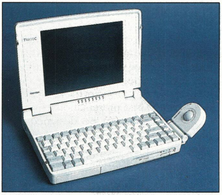
Three units were provided by Toshiba Australia for testing by *APC* — the T1900C, T4600C and the T6600C. The T1900C and T4600C are both notebook 486 machines, while the T6600 is a multimedia portable machine.

T1900C

The Toshiba 1900C is a machine physically similar to the 4600C, but with lower specs and, of course, a lower price. It uses a 20MHz 486SXA processor, has a 120M hard drive and a Sharp passive STN colour LCD.

The keyboard is very supple and the keys have a relatively long travel. Unlike the 4600C, this unit does not come with an LCD status display panel, but there are LEDs to indicate battery condition/use, mains power, numeric lock and caps lock.

An expansion bus does not come with the unit; for peripheral devices users must rely on the parallel, serial and video ports. There are external ports for a keyboard and mouse and a QuickPort connector is present on the right-hand side of the unit to attach a Microsoft Ballpoint Mouse. The T1900C runs at 3.3V off a Nickel Metal Hydride battery. On rundown tests this battery only lasted 56 minutes, a disappointing result and one that doesn't inspire serious use away from mains power. It was also a surprising result, as previous Toshiba models we've examined have typically provided more than two hours of raw juice.



The Toshiba T1900C scored best in the Graphics WinMark tests. Best feature of this machine: its sturdy keyboard

The battery is easily removed, sliding out from the front of the unit — there is no need to disconnect anything and turn the unit upside down. Considering the battery life, owners should consider purchasing a second battery and charger.

The performance of the T1900C also leaves much to be desired. The DOSMark was 21 per cent below the average result at 17.35, the blame for which is evenly spread across performance categories, especially the Memory harmonic, where it was the lowest ranked unit. In the WinMarks, the machine performed quite well in the graphics test with a score of 2.88 megapixels per second — only 17 per cent below the average. In the Disk WinMark however, the machine had one of the lowest results of the test group at 17996.5, which was 25 per cent below average results.

The unit comes standard with 4M of RAM and a 120M hard disk.

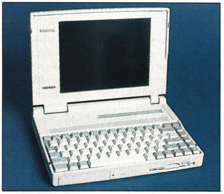
Memory cards, standard across the Toshiba range, cost $564 for 4M, $986 for 8M and the 16M card, giving a total of 20M of RAM, is $3189. The unit has a single PCMCIA slot for either Type I, II or III cards. A PCMCIA MNP5 fax-modem can be purchased for $684.

The T1900C is a unit with average performance and comes without an expansion port. While Toshiba units are sturdy and have a good track record in the notebook field, and have one of the most roadworthy formats available, at $5270 for the 120M unit or $5966 for the 200M, the T1900C cannot be considered a great bargain.

T4600C

The T4600C is one of Toshiba's top of the line notebooks. It comes with an active matrix screen, LCD status display, 486SL33 processor and Microsoft trackball. The Nickel metal hydride battery is easily removed as in the T1900C. The keyboard bends slightly under typing pressure, which is initially disturbing, because while not unique among notebooks, this is Toshiba. The 24cm diagonal DTI active matrix screen provides a clear display that would be difficult to fault. The Microsoft ballpoint mouse has a QuickPort connector on the right-hand side of the unit.

There are two PCMCIA Version 2.0 slots, for anything up to Type IV cards. The same PCMCIA modem available for the T1900C is sold as an option with this unit. A Toshiba 150-pin expansion port has been positioned at the rear of the unit and is easily accessed by a pop-out panel. The rear ports — parallel, serial, keyboard, mouse and VGA — are also easily accessed via a flip-down cover. The unit can connect to the $1269 DeskStation IV docking unit.



The 4600C comes with an active matrix colour screen, LCD status display, 486SL/33 CPU and Microsoft trackball. Best feature: Windows performance capabilities

The T4600C comes with an LCD status display. Battery condition is shown; percentage charge when plugged into the mains and time remaining when running off the battery. The RAM can be upgraded to 20M via Toshiba memory cards.

We found the performance figures for this machine also disappointing, considering the processor. At 19.05, the DOSMark was 13 per cent below average and due mainly to the poor Disk harmonic of 16.7, a huge 26 per cent below average results. The Disk performance of this machine improves significantly in the SMARTDRV-enabled disk WinMark. The result in this test was 25250, five per cent better than the average.

The machine's Graphic WinMark was 3.88 megapixels per second, a good result and 11 per cent above average. From these results it is quite clear that this machine will perform well running Windows. The battery also lasted nearly 50 minutes longer than the T1900C (one hour, 44 minutes). Like the T1900C this is a solidly-designed and built machine. The standard unit costs $8639, while the 200M and 320M units are $9277 and $10,204 respectively.

Toshiba's reputation for reliability, the quality of its unit's design, and the almost fanatical admiration of thousands of users who keep turning to the company, are all factors that you can't benchmark. Performance analysis is also influenced by expectations, and we had expected better from Toshiba. Nonetheless, the T4600C performed in the middle of our sample overall, and was ranked just behind the Sharp PC-7750, the ThinkPad 350C, and the NEC Versa/25M. For the price, users should seriously consider the performance offered by this unit in comparison with similarly priced brand-name notebooks.

T6600C

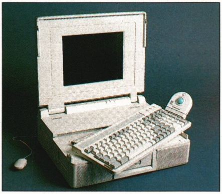
The T6600C is an MPC-compliant unit specifically designed to incorporate sound and video for both authoring and demonstration purposes. It is an ideal tool for organisational training, staff technical instruction and MIDI system control, and with the addition of the necessary hardware, can open the world of video conferencing.

The base unit is better described as transportable rather than portable. It is the size of a large briefcase, weighs 7.8kg and only runs of mains power. It comes standard with an active matrix display, 510M hard drive, internal stereo speakers and a Yamaha OPL3 internal sound system, compatible with the Microsoft Windows Sound System. Internally there is room to place two full-length 16-bit ISA cards, and there is a spare 5.25in drive bay. There is also a Type III PCMCIA slot to allow network or modem cards if both ISA slots have been filled.

The unit we tested had been configured to allow hardware, specifically multimedia hardware, to be easily incorporated. A CD-ROM drive is optional for the 5.25in bay and an internal SCSI connector is present to allow the drive to be connected without a controller card. The SCSI port may, of course, also be used to connect the optional 1G hard drive. External SCSI devices can be accommodated with the external SCSI port.

One of the main purposes of this machine is to allow the digital video interactive (DVI) system to be used in multimedia presentation work. A DVI board can be added in one of the two ISA slots, with the other one taken up by a capture board. Toshiba recommends the use the Intel Fast DVI Delivery Board and ActionMedia Capture Module. The Fast DVI Board can playback both RTV (real-time video) and PLV (production-level video). The RTV quality is suitable for most applications and it can be recorded using the capture board. PLV is high-quality video that is digitised by Intel ready for playback.

Using the combination of the Fast DVI Board and the Intel capture board allows users to produce video clips in realtime that may include special effects. Using a multimedia authoring program these clips can be incorporated into presentations.



The T6600 — Toshiba's transportable weighs 7.8kg and is designed for use as a multimedia machine. Best features: its brilliant inbuilt capabilities and astonishing speed and power

Presentations can be designed to be played back using a standard PC with sound capabilities. Of course, one of the benefits of this machine is its portability, allowing the machine to be easily taken to the demonstration point. These boards, specially modified to a work with the LCD display, are distributed in Australia by Megavision on (02) 975 1877.

The T6600C is a high performance unit that is based around Intel's 486DX2/66 processor, 8M of standard RAM and 1M of video RAM. On the benchmark tests the machine's performance was extremely good. For instance, the DOSMark score was 39.14, thanks to a high Processor harmonic of 11368 and Disk harmonic of 44.24. By comparison, the best performer notebook in our survey, the TI, had a DOSMark of 32.85 and Disk harmonic of 33.17.

The T6600C's Windows performance blew us away. While we've heard claims from the US of machines with higher Graphics WinMark scores, the T6600C's score of 45.5 megapixels per second was nearly double the highest score we've previously seen on a tested unit — any unit, desktop or portable. The Disk WinMark of 49444 was also well ahead of the pack. We didn't include these brilliant performance results in our performance tables, because basically, this unit is a different beast to the run of the pack.

The unit comes with a 10.4in diagonal TFT Active Matrix Colour LCD that remains active even when a monitor is attached to the external monitor port.

The case has been solidly designed, and internally is separated into three regions: the ISA port bay, the internal 5.25in drive bay area and the motherboard/CPU region. The frame is a steel structure with plenty of cross bracing, while the exterior is plain plastic. We found the case difficult to open; to get to the ISA ports seven screws must be removed, and to access the drive bay area, the unit must be turned upside down and 14 screws removed — including a number buried at the bottom of 'screw wells'. The 101-key keyboard is detachable from the unit and a Logitech ballpoint mouse with

AT A GLANCE

Toshiba T1900C

Distributor:	Toshiba Australia
Telephone:	(02) 887 3322
Price:	$5270
Specifications:	Intel 25MHx 486SXA (3.3v) CPU, 4M of RAM standard, expandable to 20M, 120M hard disk, Sharp passive STN colour LCD display.

Toshiba T4600C

Distributor:	Toshiba Australia
Telephone:	(02) 887 3322
Price:	$8639
Specifications:	Intel 33MHz 486SL CPU, 4M of sadard RAM, expandable to 20M, 120M hard disk, two PCMCIA slots, colour active matrix screen.

Toshiba T6600C

Distributor:	Toshiba Australia
Telephone:	(02) 887 3322
Price:	$13,797
Specifications:	Intel 66MHz 486DX2 CPU, 8M of standard RAM, expandable to 72M, 510M hard diisk, Type III PCMCIA slot, TFT active matrix colour LCD screen, plus internal stereo speakers, and Yamaha OPL 3 internal sound system.

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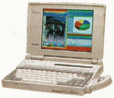
T6600C



T4600C

T1900C

T100X

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SASS 489A TOS

cable connector can be attached to it. A fold-away handle is part of the case.

MS-DOS 6.0, Windows 3.1 and Microsoft's Windows Sound System come standard with the unit. At $13,797 for the base unit, the T6600C is not a cheap option, and to be video proficient will cost another $8107. However, if you consider the multitude of uses this machine can be put to, then even at this price, it could be the perfect choice. This is also the best Windows graphics performer we've seen here at *APC* by some way, blitzkrieging not only any other portable, but any other desktop.

Total Peripherals NB486DX-33

By Stuart Bowman

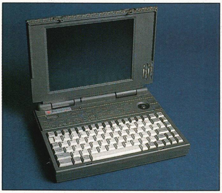
AT A GLANCE

Total Peripherals NB486DX-33

Distributor: Total Peripherals
Telephone: (02) 417 7455
Price: $3890, mono; $7140 colour screen
Specifications: Intel 33MHz 486DX CPU, 4M of standard RAM, expandable to 32M, 120M hard disk, PCMCIA slot, with monochrome LCD, or active matrix colour screen.

For a mere $3890, the Total Peripherals NB486DX-33 comes with a 10in monochrome screen, 120M hard drive and inbuilt trackball. The same machine is available with an active matrix colour display for $7140.

For a machine that boasts a 33MHz 486DX processor, one would expect better performance. The Processor harmonic of 5803 is more in line with a 486/25 than a 33MHz machine. The Video and Disk scores at 2633 and 20.37 are 16 and 10 per cent below average. A saving grace is a Memory harmonic of 8937, which is 73 per cent above average. The Windows DiskMark of 23459 was around average, while the graphics at 3.13 megapixels per second is 10 per cent below average.


Total Peripherals' NB486DX-33 is available in a mono screen version for $3890, or with active matrix colour display, $7140. Best feature: expansion options

Multiple expansion is possible via the PCMCIA socket, expansion chassis or internal modem option. External CRT, mouse and keyboard are all supported. The keyboard is a standard layout, the only problem being that the whole keyboard flexes each time a key is pressed.

The monochrome screen is capable of 64 shades of grey at a resolution of 640 by 480 and a simultaneous external display of 256 colours at a resolution of 1024 by 768. Some slight ghosting was apparent, and the viewing angle for the monochrome screen was limited.

APM access is via a ALT hotkey. From here the power management functions are controlled, but unfortunately, this also gives access to the complete CMOS, often a problem for inquisitive novices. When run down, the battery lasted for two hours, two minutes, which was the average time for the machines tested.

Total Peripherals also produces the NB486SX-25T; $2995 for the mono version and $5710 for the colour. This machine was unable to complete the DOS benchmarking program, which might suggests compatibility problems, and after running one Windows disk test, the machine locked up each time we tried to load Windows.

With a 12-month return to base warranty, the mono 486/33 machine would be an excellent portable for the office, with easy connection to the network. At over $7000 for the colour machine, there are better alternatives. As for the 486SX/25 machine, if this is how it ships to customers, I wouldn't recommend it.

Zenith Z-Note

Zenith Z-Sport

Zenith Z-Lite

By Steve Chen

For this review, we examined one machine from each of Zenith's three lines of notebooks, the full-performance Z-Notes, the value-line Z-Sport, and the excellent little subnotebook, the Z-Lite.

As we were going to press, Zenith released upgrades to its Z-Lite and Z-Sport families, too late for inclusion in this review. The current Z-Sport family is being replaced by the Z-Star value line, and the Z-Lite has been upgraded to an Intel 486SL/25-based CPU. Although we haven't seen them yet, the new models sound as though they address the faults we've outlined; the Z-Lite is too slow, and the Z-Sport lacks expansion and functionality.

The new Z-Lite 486SL/25 4/120 with front-mounted trackball will sell for $5787. The Z-Star series uses a keyboard-integrated 'j-mouse', which we assume is a variation on IBM's TrackPoint, and the 4/33VL 4/170 will have a PCMCIA slot and will sell for $4313. The Z-Start 4/33VLP will have a 200M drive and dual-scan passive colour display, and sell for $6010.

The new version of the Z-Note, the 4/33, will sell for $10,911 in addition to the current 25MHz models.

Zenith's three Z-Note portables are solid performers that are network-ready and reasonably priced, with features that in many ways set them apart from the competition. The machines turned in above-average performance and had impressive battery life. They are also in a class with IBM and NEC with their stylish design.

The value-line Z-Sports offer good value and reasonable performance, holding up admirably when compared with reviewed portables equipped with 486DX CPUs. Unfortunately, the Z-Sports lack a built-in pointing device. They do have good battery life though, and reasonable screens.

The Z-Lite 320L is a small and lightweight subnotebook with a clear display, good battery life, and plenty of expansion options via two PCMCIA slots. But performance is lacking and the keyboard is cramped.

Z-Notes

While the Z-Notes have spacious keyboards and full-size function keys, they lack integrated pointing devices and have non-upgradable CPUs.

With good performance, great battery life, and integrated networking, the Z-Notes appeal

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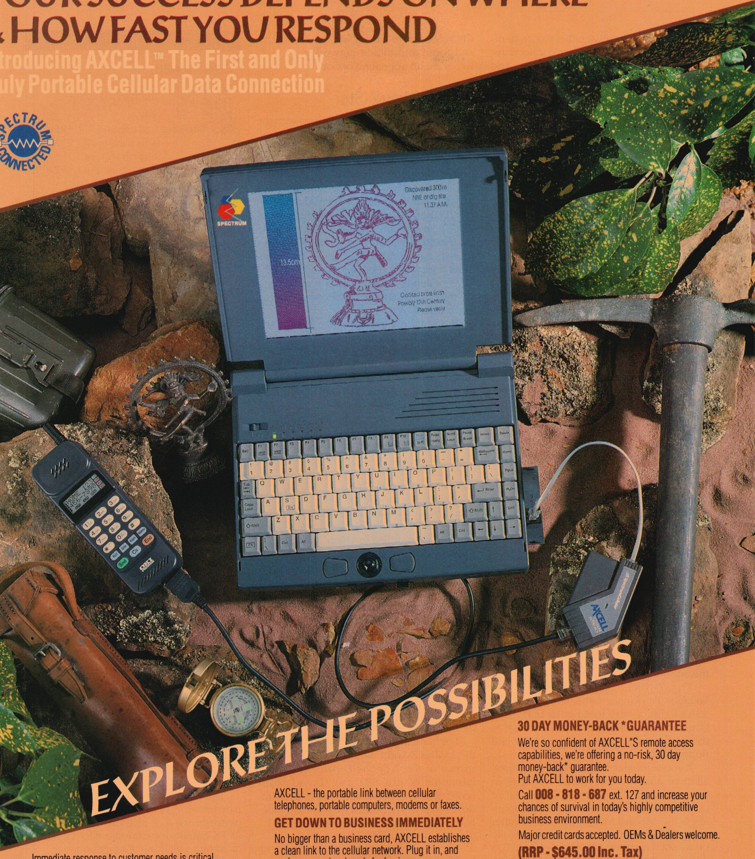
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All Z-Notes from Zenith Data Systems (ZDS) have built-in Ethernet connections, good displays, reasonable prices, and above-average performance. The units are all based on the same 25MHz Intel 486SL chip (these microprocessors are not upgradable). The systems come with 4M of RAM (expandable to 28M) and have no external cache.

What sets them apart from one other is the type of display. The ZDS Z-Note 425Ln Model 120 is equipped with a monochrome display. The slightly more expensive model, the ZDS Z-Note 425Lnp Model 120, has an above-average passive-matrix color LCD, and the ZDS Z-Note 425Lnc Model 200 has an active-matrix colour display.

The 486Lnc was clustered for overall relative performance with the Compaq 4/33C and the AST Bravo, and ranked 13th.

Breaking this down, the Z-Note's DOSMark was easily the best of any 25MHz notebook, and ranked 12th with a score of 24.03, and better than several 33MHz performers, including the Compaq and Sharp.

Processor performance was moderate at 5955, and the Memory harmonic quite poor at 4189, although DOS Video was 12 per cent above average for our survey at 3530. Disk performance was a completely different matter; the 200M Seagate IDE hard disk with 64K buffer really shining with a harmonic of 27.27, ranking eighth and 20 per cent above average. The Disk performance carried over to Windows, with a score in the top 10 of 27440.

Windows Graphics performance was less impressive, 16th overall with a score of 3.3 megapixels per second.

The Z-Notes come standard with a spacious keyboard that does not give the user the typical cramped feeling associated with many other notebooks. Most function keys are full-size and clearly marked, and the keyboard's audible click can be turned off. These units, however, lack some of the full-travel feel found on other portables in this roundup.

The Z-Notes come bundled with a Logitech Trackman. Rather than using LED status lights, a small rectangular LCD panel (about the size of a 5.25in disk label) gives the status of such things as hard disk and floppy disk.

If you're looking for networking features, all three units are ready to go with built-in Ethernet-compatible ports and preinstalled client software. All that is required additionally is the optional Media Adaptor for either a thin, twisted-pair, or 10BaseT cable. While no external expansion box is available, ZDS does offer a port replicator for speedy attachment and detachment.

The Lnc's raw battery life was easily the best of any colour notebook, lasting two hours 39 minutes.

With excellent performance for their CPU class, great battery life, good displays and form, and inbuilt networking, the Z-Notes are an appealing option.

Z-Sport/New Z-Star

While Zenith is replacing the series with the Z-Stars, the Z-Sport series is a good notebook line, and if Zentih's new releases can correct the flaws, they will be a line to watch, with prices competing directly with the NEC Versa/25M and Compaq Contura. If cost is a major factor in your notebook purchasing plans, take note that the Zenith Data Systems' ZDS Z-Sport 420S and ZDS Z-Sport 425S machines offer low price tags, but with fewer features and lower performance ratings than other reviewed notebooks in the ZDS family. These value-line models offer a good compromise between cost, processing power, and features.

Both of these machines use 20MHz and 25MHz Intel 487SX microprocessors, which are pin-compatible with the more widely used 486SX chips, but include an external maths coprocessor, which gives them overall performance similar to 486DX chips.

Introduced before the 486-based Z-Note series of notebooks, both Z-Sport models offer a smaller 8.5 by 11in footprint. However, useful features such as built-in Ethernet connections and built-in pointing devices are missing in the basic Z-Sport models.

Instead of a port replicator, a connector is provided for an optional docking station. The keyboard is fairly standard, except that several of the function keys are slightly smaller than full-size. Moreover, the Z-Sports lack the full-travel key feel of some other notebooks in this roundup.

Automatic power-management features come standard with the Z- Sports. The nickel hydride battery pack delivered two hours 49 minutes on our Battery Rundown test, the fifth best result in our comparisons.

Neither notebook's battery lasted as long as the monochrome Z- Note 425Ln Model 120, but both Z-Sports had endurance that was nevertheless respectable. While the units themselves are compact enough, their AC adaptor bricks are a little bit on the bulky side.

For benchmarking, we concentrated on the 25MHz Z-Sport. The DOS Video performance of the Z-Sports is pathetic, with a harmonic of just 880, the second worst score and 72 per cent below average. Windows graphics performance was moderately better, although still sixth worst at just 1.7 megapixels.

The Processor score (6127) was good, but the Memory harmonic was again below average. Performance from the 121M Conner CP2124 IDE hard disk with 32K cache was also poorly under DOS (37th at 17.11), although slightly better under Windows (26th at 21280).

AT A GLANCE

Z-Note 425Lnc

Distributor: Z-Express
Telephone: (02) 417 1522
Price: $9684
Specifications: Intel 486SL/25, 4M of RAM expandable to 28M, 200M hard drive, 21.6cm active matrix colour display, PCMCIA

New Z-Star series

Distributor: Z-Express
Telephone: (02) 417 1522
Price: $4313
Specifications: Intel 486SL/33, 4M of RAM, 170M hard drive, monochrome display, PCMCIA

Z-Lite series

Distributor: Z-Express
Telephone: (02) 417 1522
Price: $5787
Specifications: Intel 486SL/25, 4M of RAM, 120M hard drive, front mounted trackball, PCMCIA

Z-Lite

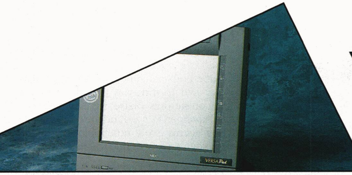
If you're looking for a small, lightweight subnotebook, the ZDS Z-Lite 320L will easily fit the bill. It's powered by a 20MHz Intel 386SL processor and equipped with a 61M hard drive. Memory can be expanded from 2M to 10M. Zentih is thankfully upgrading the subnotebook to an Intel 486SL/25, which while increasing the price to $5787, will address the unit's only real problem, performance. Like other units in this category, the floppy disk drive is external. What sets the Z-Lite apart are two PCMCIA Type II expansion slots.

In addition, the unique LitePoint two-button pointing device easily attaches to the front of the keyboard. It may be small, but the Z-Lite includes all the standard ports plus a PS/2 mouse port. It is missing a port replicator, however, like the one found in the Z-Note family.

The unit's external monitor port supports simultaneous display, but only at 640 by 480 resolution. File transfer software and cable are included. The Z-Lite weighs less than six 2.7kg, while remaining sufficiently large to accommodate its 8.5in screen.

The Z-Lite was not included in our comparisons due to its out of series 386SL/20 performance — it wouldn't have been fair, its DOSMark, for example was 11. This is not a unit you'd buy for performance.

The 83-key compact keyboard does feel a bit cramped — even if you have small hands. The unit's Battery Rundown time of three hours 31 minutes is on the high side, and would have been second best in our comparisons.



BY JEREMY TORR

Pen PCs:

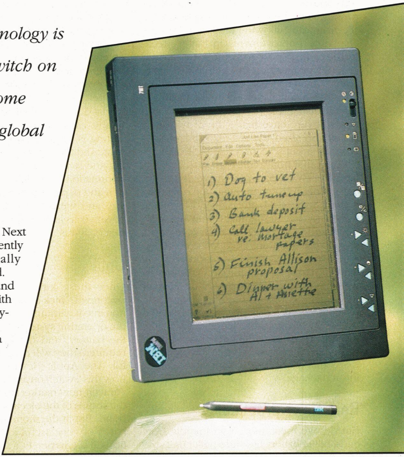
Computer-phobic's delight

Apart from getting smaller, PC portable technology is getting smarter. Users now merely need to switch on and scribble. APC scratches the surface of some pen-pad PCs that take the next step into the global data revolution.

The first way we learn to communicate is by speaking. Next comes writing with pen on paper. The final and currently most sophisticated stage still uses a device originally designed to slow down the input of words; the keyboard.

Although a fast typist can input words more quickly and accurately than most scribblers, there is one basic problem with typing. You simply can't do it without a keyboard, and keyboards don't like rough places.

Everybody who has tried to type fast and accurately on a train, plane, or at a building site will know the problem. Keyboards are designed for flat and stable surfaces, not the open air or on your knee. But the alternative – pen-pad PCs – are showing technologies that let users substitute a plastic screen for a piece of paper. And they are becoming better all the time. That's not to say they are brilliant; they're just improving rapidly and deserving of a good look. Especially for anyone tired of data entry and transcription.


1) Dog to vet
2) Auto tune-up
3) Bank deposit
4) Call lawyer re. mortage papers
5) Finish Allison proposal
6) Dinner with Al + Anette
IBM

Australian Personal Computer
EDITORS CHOICE

■ TCG GRID 2260 Convertible

When looking for any PC system, two things must be considered ahead of all others. First, does it work, then, second, how easy is it to get it working. On those two criteria alone, the GRiD from TCG must be top of the list.

The central issue here is not that it is much better, faster or more up-to-date than the other pen PCs. Rather, it is that the other machines are not yet fully developed. If you could turn on the power switch, format a hard disk, load an operating system and still work when the pen battery is flat; that would be a fully developed pen system. Or if you could switch on a machine that had the whole operating system and application library in hard memory; that would be a fully developed system. Both would mean no DOS-level commands were required, no system knowledge was required and no transactions other than data input and manipulation were needed.

As we have not reached that level of development, the result is that the GRiD is the most useful machine even if it is a hybrid. It is also most rugged, practical and definitely the slowest. Nonetheless, it has more to offer than all the others we looked at.

Improvements

The two main areas in which previous attempts at pen computing have been less than successful are input and usability. Recognising the enormous variation in handwriting styles, and making a workable-sized screen/pad coupled with reasonable battery life have always presented problems. As you will be able to see from our following review, things are changing. Improvements in battery technology, less power-hungry CPUs and cheaper memory are all helping to make realistic field usage a practical proposition. Likewise, recent developments in both LCD screen displays and handwriting recognition software have made the provision of reasonably sized, easy-to-read and reliably-accurate input screens a real possibility.

The other noticeable feature that all this latest batch of pen pads have is the inclusion of a fully-operational pen operating system. So far, the battle is really only being fought by two contenders: Pen for Windows and Go's PenDOS. Both give good, easy-to-use icon-driven operation of the whole machine. This is obviously a big attraction to computer phobics who simply want to switch on and start writing. Most of the usual controls — brightness, contrast, on-off and reverse display — are operated by easily recognisable icons, and all the machines can be configured to boot straight into whatever software is required; in many cases this would be a forms-based data input package.

Realism vs practicality

But despite these more user-friendly front ends, better battery life and smaller unit size, it still is questionable whether the pen computer has come of age. Training the PC tablet to recognise handwritten input takes some time, and even then still misses the occasional letter or word. Additionally, it is likely to spit the dummy if another user tries to enter data. Paper forms don't do that. (See also APC cover story on PDAs, November 1993).

But paper forms can't check inventory, suggest alternatives or change data entry rules on the fly either. Remember, these PCs are being stacked up against a conventional notepad and pencil allied to conventional data entry and processing at a remote station.

Obviously, the enormous advantage of the pen PC is the ability to be much more than a dumb terminal or data entry device. If any calculations, validity checking or sorting is required, it can be done on the spot. And the capacity for intelligently sorting and storing large amounts of complex information in the field is much greater than pen and paper. Unfortunately, the physical size and weight of pen PCs is an added negative, as is the requirement for a special pen or stylus.

Until

Once these kind of PCs are so simple anyone can pick one up and input information into it without knowing anything about the operating system, the state of charge of the battery, and the kind of pen strokes required, they will truly be universally useful. The Apple Newton PDA has shown how this 'switch on and write' approach can attract a new market of non-PC-literates to the shores of the electronic data processing pond. But at the moment, despite a whole batch of very useful and specific applications, it seems pen PCs are still a technology in search of a job to do as far as the wider PC market is concerned.

Once both machines and applications have grown up and away from the 'Etch-a-Sketch on steroids' phase, we may well see a few more pen PCs around the office. Until then, it seems likely notebooks and their pesky keyboards will rule the roost.

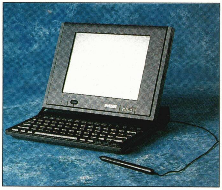
TCG GRiD 2260 Convertible

GRiD has been around a long time in the portable market. A fair proportion of that time has been spent developing systems for the military market; it shows. The GRiD has more gadgets, levers and secrets than Terminator 2. Unlike the other pen PCs, though, it is all very clunky and functional: hard edges, squared off design and solid-cast magnesium casing rather than the smoothie plastic feelgoods from the opposition.

Still, GRiD's stark functionality hides a pleasant secret. An integral keyboard. Press a couple of buttons on the side and the 200 by 150mm LCD screen slides obligingly up and back to reveal a full keyboard underneath. Not only that, the screen assumes a locked in 60-degree position — ideal for laptop working.

As well as this vitally important extra — anyone who has had to find, plug in and reboot from a pen PC keyboard thanks to a system crash will know how important it is — the GRiD is a truly useful pen PC. It is also excellent at handwriting recognition, with a very high initial accuracy rate.

Its matching stylus comes with a clip and cord so it doesn't get lost. There is a PCMCIA slot, a serial port, external VGA socket, external 3.5in floppy/parallel port, brightness and contrast controls and a trio of indicator lights. The battery pack is completely separate and clips on the the rear of the unit — two are supplied as standard. The CPU in our test machine was an Intel 386SX/25, and there is an option for a 486



The GRID 2260 Convertible. Best feature: its sturdy and practical design version. Completing the package is 4M of RAM and a 120M hard disk.

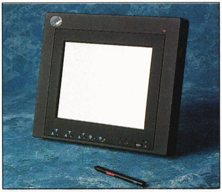
Apart from its robust nature, one other extremely useful extra is that the GRiD packs into its tiny frame the provision of a DOS-level keyscreen. You can choose to run Pen Windows, DOS or DOS with its own onscreen keyboard. This is so useful it is hard to describe. You can input all the normal DOS commands direct from a (pretty basic, admittedly) screen keyboard display, then go back to the totally pen-based display by tap-typing WIN. Brilliant.

Battery life on the Convertible was good. We got over two hours running at full speed. Any slower and Pen Windows was a bit of a crawler anyway. Battery life in the pen was not measured, but it is likely it would be fairly good unless you do an awful lot of clicking. Overall, the GRiD is easily the most practical pen-based computer we looked at, with everything for almost any user on the move. Even if it is not the best looking.

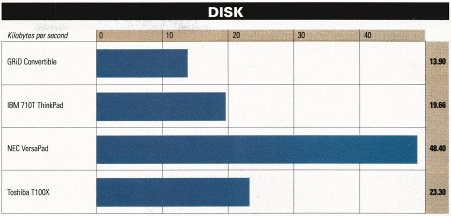
IBM 710T ThinkPad

Even if IBM has come into the pen PC area slightly later than some other vendors, it has, as with its other ThinkPad models, done a good job.

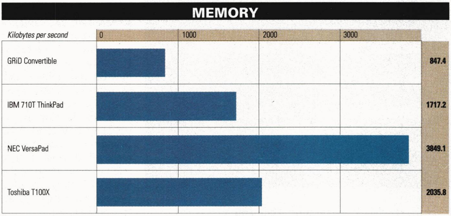
Supplied in what is easily the best bag, with velcro and flaps everywhere, the ThinkPad 710T comes with tons of expansion capabilities. An external floppy, one free PCMCIA II slot, a 60M hard disk and enough ports to poke a stick at. It also features some really nice-looking but hard to work controls recessed into the front panel, a very smart carrying handle and IBM's own PenPoint DOS, courtesy of Go Corporation. The 710T's format is exactly that of a thick A4 pad, with only the pen and the on/off switch on the side. This makes for very easy control access when working on the front with the stylus.



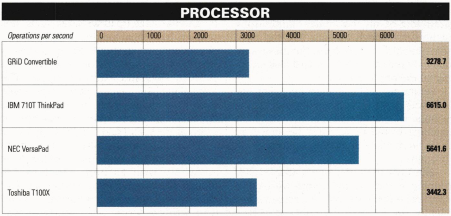
IBM's 710T ThinkPad pen notebook. Its best features are its expansion options and well-designed format



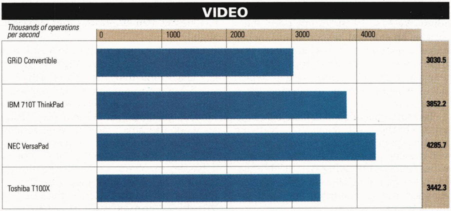
DISK



MEMORY



PROCESSOR



VIDEO

The advantage of the 710T's included PenPoint OS is its speed. It seems to be slightly faster on both boot and application than Pen Windows. Microsoft's offering, although using the old familiar interface, overlays Windows, which in turn overlays DOS. The 710T usefully allows everything from first switch on — setup, configuration, power utilities — to be pen operated via an icon-based screen. This is not the case with Pen Windows, which almost always need the occasional foray into DOS to fix something. Then you need a keyboard!

The strengths of the ThinkPad 710T are IBM's extensive backup, the reasonable cost, the good range of expansion options and the well-designed format.

Pen input is fairly fast, with good interpretation of my particular handwriting without too much training. We did have some initial boot problems, but these were due to some over-zealous hard disk cleaning by the previous user.

Setting up and using the PenPoint system was not too tricky, although to the average non-computer person (who this machine would presumably be aimed at) there were some confusing options to sift through.

The 710T uses IBM's own 486SLC CPU running at 25MHz, and comes with 4M of RAM expandable to 12M. The screen is just slightly smaller than the GRiD at 195 by 145mm, but is clear in most light apart from direct sunlight. In addition to the usual disk, printer, VGA, serial and floppy ports, there are also an external keyboard and mouse sockets, plus an external docking port. One gripe was the length of the floppy cable — only about six centimetres long — which makes it really difficult to position when being used.

The strengths of the 710T are IBM's extensive backup, the reasonable cost, the good range of expansion options and the well-designed format. The only downside is the choice of operating system; although it is faster than Pen Windows, the applications are not so common. Still, you can always swap.

NEC VersaPad

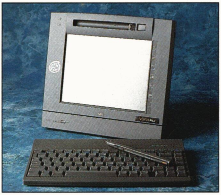
As with most NEC products, this one looks the business. It is a very attractive creamy grey colour, has a matte plastic finish, logos aplenty, and very discreet lights and beepers. As standard, the VersaPad is kitted out with a 486SL/20MHz chip, has 4M of RAM (ours came with and extra 4M on board) and a 40M hard drive.

About the same size as the IBM, it has a few more design smarts than the Big Blue offering. The pen stylus sits just above the 195 by 145mm screen, ready to spring into life either on the screen itself or a range of six HotZones down the side. Why they are called HotZones is not clear; they operate utilities such as reboot, setup, backlight, battery level and such. Not that hot. An external battery level, LCD display on the detachable pack tells how much juice is left — even when off the VersaPad. Very useful if you have a couple of battery packs and don't want to boot up to see how much is left.

NEC seems to have veered between the PC and the scratchpad with this Versa. It is sparsely functional looking, but has plenty of conventional attributes. External devices supplied include a floppy drive, two PCMCIA slots and a power supply. The sides of the NEC have plenty of flaps (some even have sliding doors in them as well) covering a generous array of serial, printer, external VGA, and external keyboard.

The NEC seemed to take ages to perform a DOS boot-up; only the Toshiba took anywhere near as long. Once in use though, the benchmarks show it is a useful data cruncher in its own right. When inputting written script, the VersaPad was reasonable when deciphering and responding. After using the training facilities in Pen Windows, this increased slightly.

The pen supplied with the Versa was the easiest to use, being slightly bulkier but less round than the others. This is a small but important aspect of pen PCs. Main unit battery life was reasonable at around 1.5 hours in normal use. Using some of the smart power management utilities included should better this. Using a PCMCIA slot was, like the GRiD, a bit of a hassle, involving CONFIG.SYS file alteration. The Toshiba's plug and play alternative is much better. Although Pen Windows comes with the NEC, no demonstration programs or sample forms software were included.



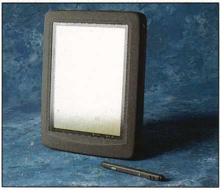
The aesthetically-pleasing NEC VersaPad. Best feature: the machine's layout and design

Overall, the NEC is easily the best performer but was a slight disappointment at the input level. Initial response to the unit was very good, but in use it provided no real bonuses or surprises. Still, as a good example of how to make a product look really good; the VersaPad is the best.

Toshiba T100X

If the future of design is for rounded shapes with minimal controls, Toshiba is in touch with tomorrow. The T100X is the smallest, most cuddly of all the pen-pads we looked at here. It would look really at home on any doctor's desk or any power dresser's briefcase.

Aside from its smooth appearance, the Toshiba also has a few tasty and well-thought out features that make using it a pleasure. The pen sits in a very secure yet easy-to-get-at pocket within the casing, contrast and backlight controls are touch sensitive to pen tap, and the on/off switch is only manual control. The screen is a very crisp 195 by 145mm LCD with backlighting but no brightness control.



Toshiba's T100X pen pad. Best feature: streamlined approach to pen computing

QF-3

QF-8

QF-5

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Each T100X comes with a spare battery and printer cable, and all the setup configurations you could ever want are included in a special Utilities group inside Pen Windows. Compared to the other Windows-based machines, the Toshiba is definitely the most polished product.

Under the flap at one end nestle two PCMCIA slots ready for action, and another flap on one side has a good range of ports included. The only snag with Toshiba's approach is its proprietary ports. Apart from a standard RS232 and DIN keyboard port, all the other sockets are Toshiba's own special connectors. 'All' means the other two; an external VGA display port is strangely not included. Both floppy and printer ports use special Toshiba sub-miniature multi-pin connectors of the type that are likely to be annoyingly hard to find — none of the other machines' floppies would fit.

> **Of all the machines supplied, the Toshiba had easily the best manuals. Full machine and Pen Windows operating instructions were supplied.**

The T100X uses a 386SXLV, with 4M of RAM and a 40M hard disk. Battery life was quite good at around two hours; certainly better than the NEC. Booting up into Pen Windows though, it was the slowest of the bunch. Handwriting recognition was reasonably good with a degree of training, but not up that of the GRiD. It was also slightly slower than the NEC and IBM on recognition in our tests.

One slight problem we had with this machine was the pen batteries going flat; this could be a one-off, but they only seemed to last for a few hours. Luckily, the NEC stylus worked fine on the T100X screen. Although the external keyboard was not supplied, the NEC unit again stood in. Using both power supply and keyboard together proved a bit of a squash as the sockets were very close together.

Of all the machines supplied, the Toshiba had easily the best manuals. Full machine and Pen Windows operating instructions were supplied.

However, despite the slightly fiddly ports and slow Pen Windows load, the T100X should perform well enough in any situation where simplicity is the keyword.

Fujitsu 325 Point

Operating on the best of current portable technology, the 325 Point has an Am386SXLV/25 CPU running into 4M of RAM, expandable up to a total of 12M. It has a good if not brilliantly crisp 195 by 150mm 64 greyscale LCD screen, a couple of PCMCIA slots and obviously, a pen.

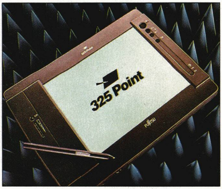
The review machine was evaluated away from our labs test site, so unfortunately the official benchmark suite was not run on the particular machine. Preliminary test results are noted here in the text, however.

The Fujitsu has some commendable inbuilt features. Using power conservation techniques, the battery has a claimed life of between three and eight hours. Our test unit lasted a full day of high-level scribbling and silly drawings in our preliminary tests; the best of the bunch. Standard ports include parallel, serial and external VGA, as well as a proprietary external floppy, all under a neat plastic flap. External keyboard and a fast-charge power supply are also provided for. The unit can alternatively draw power from a static desk pack if required.

The review machine had the dinkiest little 42M hard drive you have ever seen sitting in one of the PCMCIA slots; the other slot can take any RAM, modem, LAN or other PCMCIA II card required. A inbuilt infra-red communications port is also standard.

Pen Windows booted up in a fairly speedy four seconds from Doze power mode, but was quite slow from the DOS line.

The pen, which sits behind its own enclosed door in the casing, does not have a battery, but works electromagnetically on the etched LCD screen — please note Toshiba! Handwriting input was quite good. Less training than the Toshiba seemed necessary on first acquaintance.



The Fujitsu 325 Point. Its best feature: attention to added extras

A couple of sample pen applications are provided, including the usual blank forms which you fill in with squiggles that the 325 Point transforms into standard text. Sadly, given the quality of the rest of the unit, the 325 Point had a pretty average display. It was either off or on, like the Toshiba, but not so clear.

Fujitsu seems to have a come up with a good product with its first foray into the pen PC market, with some nice features and good expandability. If the company can tart up the display a bit it will no doubt be a viable pen contender

Product details

GRiD 2260 Convertible

Distributor: TCG
Telephone: (02) 699 8300
Price: $4076 for 4M of RAM, 120M hard disk, Pen Windows.

IBM 710T ThinkPad

Distributor: IBM
Telephone: 008 815 154
Price: $6022 for 4M of RAM, 60M hard disk, PenPoint Operating System.

NEC VersaPad

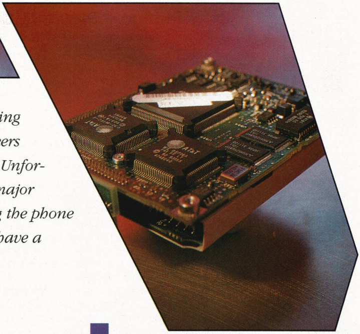
Distributor: NEC Information Systems
Telephone: 008 812 796
Price: $5920 for 8M of RAM, 40M hard disk, Pen Windows

Toshiba T100X

Distributor: Toshiba
Telephone: (02) 887 3322
Price: $6080 for 4M of RAM, 40M hard disk, Pen Windows

Fujitsu 325 Point

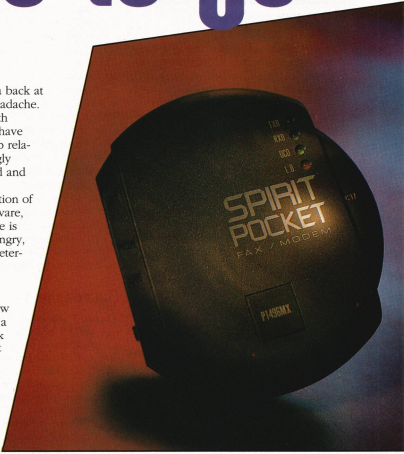
Distributor: Fujitsu
Telephone: (02) 410 4544
Price: $8000 for 4M of RAM, 42M hard disk, Pen Windows and power pack.



The shrinking size of portable power makes taking your PC with you easier than ever. Mobile workers can now have as much power as they can use. Unfortunately, communications has always been a major stumbling block for travelling PC users. Linking the phone line has never been easy; but at least you now have a few options.

Modems to go

BY JEREMY TORR



Connecting to all that useful, recently-collected onsite data back at the head office PC or network has always been a real headache. This has mainly been due to the problems associated with portable modems. To-date, many have been slow, most have been of less-sophisticated construction than their desktop relatives, and power supply problems were always rearing their ugly heads. Not only that, most were dedicated to a particular brand and were expensive too.

Now the name of the game has changed. With the proliferation of low-power, high-performance communications chips and firmware, the possibility of putting top-line performance in a tiny package is becoming very real. Modems are also becoming less power hungry, more interoperable and at the same time more tolerant of that eternal bugbear of the portable modem – poor line conditions.

What's on offer

Most of the review samples we had a look at were fairly new designs; all were capable of being easily carried around with a lap-top, and all would satisfy the criteria of being able to work without mains power . . . for a short time at the least. This last factor is one which all users of mobile modems should be well aware. Having a battery powered, fast fax modem is certainly a reality, but battery life is still a real limitation. If you are travelling overseas or making calls when the shops are closed, make sure you have a spare battery, as a brand new one can be flattened in as little as half an hour.

Australian Personal Computer
EDITORS CHOICE

WorldPort 14400 PCMCIA Card Modem

Of all the units we looked at, one thing stood out: there is obviously no such thing as a standard portable modem. Some were fast, some slow, some power guzzlers, some real greenies. The card modems from NetComm and Dataplex show just what miniaturisation is all about, but need the right PCMCIA-equipped notebook to plug into. The Pocket Spirit and Fosh Maxlites showed you can have useful indicator lights — very important — on a portable unit. The FlashTalk Line Modem gives the lie to the idea that modems need large power supplies to get the message through. And the Compaq integral modem let us see how far internal modems have come in the last year or so. This is all good news for the buyer who wants to select the unit to suit their particular needs and preferences, but it makes choosing a 'Best of' model very difficult within such a wide range of parameters.

The bottom line in any choice should be what suits your pocket, with a solid performance in the speed range you use most (there is no point choosing superfast if you can't use that power or if it is unreliable), and most important; what suits your circumstances.

Despite the disparities between models, however, one of the units does stand out in most respects. It is faster, lighter, easy to use and so small you could forget you had it if it wasn't for that $1000+ price tag. It crams fax, data, line analysis and top performance into such a small space you wonder why PCs are so big. And it obligingly uses the power supply of the host PC to do it. The WorldPort 14400 PCMCIA card modem has set the benchmark others will follow.

The other thing to note about most portable modems is the limited feedback capacity. Unless your software is very interactive, you will not have much information on speeds, error correction, line status or incoming call type. Lights and speakers — although the Spirit Pocket is the exception — are not common.

How we tested

Each modem was set up as instructed in the makers manual, with the AT commands set to the maximum speed they could operate. In all cases where applicable, auto-select was enabled to allow step-down if this was made necessary by either line conditions or any other incompatibilities.

Data flow was set to DTS/CTS to ensure no false alarms were sent from either end to upset the smooth flow of data. Once the test units and the host (a 14,400bps/v.17 fax desktop running off a 486/25) were linked, the test suite of pcAnywhere and Telix was loaded. Telix was used to send a 256K text and graphics word processor file, and pcAnywhere ran a standard communication script to access the remote hard drive, update a file and exit.

For the local calls, we made three at intervals through the same day, and averaged the result. The international calls were all made during the same evening, apart from the WorldPort, which was set up on a separate occasion. It registered a link speed of 38,400bps, so we can reasonably assume it had a better line than the others reviewed.

We also assessed each modem on the grounds of portability, ease of use and completeness as supplied. All scores were measured out of four.

Virtually all the modems we looked at were truly 'plug and play' in that the setting up and configuring was negligible. All were fully Hayes, CCITT and MNP compatible, and most came with bundled software to get the user started.

However, not all the units were happy to talk to each other as openly as we had hoped. NetComm's PocketRocket refused to say it was talking to the Compaq at over 9600bps; despite the obviously faster transmission time, the FlashTalk had problems maintaining a link to some of the other units; and the Fosh unit seemed to take a dislike to the Banksia if left to negotiate their own transmission speeds. Still, we got them all talking eventually, but as a general rule, it would seem to be easier to go for a portable unit of the same make as the home base modem for maximum reliability.

Data dashers

As stated, we asked makers to supply current model portable modems, and most gave us external pocket units. The only odd one out of our bunch was the Compaq SpeedPAQ 144, and the new PCMCIA card modems — which are internal options — but these were included as they fit the selection parameters.

Of all the modems we looked at, the most impressive must be the US Robotics WorldPort 14400 Card. This amazing sliver of plastic is only slightly more meaty than a credit card, yet it incorporates fax up to V.17, modem up to 14,400bps and all the error correction and compression you could ever want in today's market. It is an amazing little device that represents the future; as soon as desktop PCs are produced with PCMCIA slots, you can say goodbye to that bulky external unit of yours. Banksia's new PCMCIA fax data modem is another new entry to this market, however the company was unable to provide us with a test unit for this review. For more details see October 1993, *APC*.

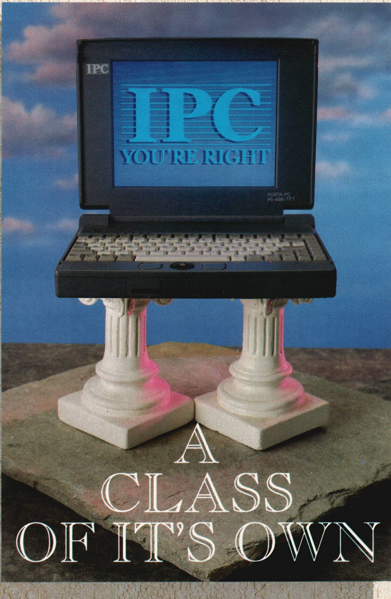
The other really notable effort (although in comparison to the rest of the bunch was painfully slow) was from the FlashTalk line modem. Although it crawled along at 2400bps, it did so without any external power supply at all. No battery, just a bit of voltage from Telecom (or whoever's line you may choose to use).

Other contenders for the notable portable award are obviously the Spirit Pocket, which performed very well in our tests; the Compaq SpeedPAQ; the NetComm unit, for including MNP10 line monitoring; and the Fosh Maxlites, for having an on/off switch.

Banksia BitBlitzer PM1414

Although we were itching to delve into Banksia's new PCMCIA fax data modem, Banksia could only submit its PM1414. The BitBlitzer PM1414 fax data modem has been around for a while, looks sturdy, comes with DOS and Windows software, a 25-pin RS232 connector, extension/adaptor cable and a battery that goes flat in 10 minutes. At least ours did. It would seem a good idea to chuck all supplied batteries

Banksia's BitBlitzer PM1414. Best features: well-proven, easy-to-use, good performance



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and get new ones before you start. It would be $4 well spent.

In use, the Banksia was easy to install and use. It has large thumbscrew connectors to make sure all those pins are tightly in place, two RJ11 sockets (line and phone) and a power-in socket. No power switch is offered, but power is automatically drawn from the best supply, be it pin 9 on the RS232, battery or battery eliminator. Auto power-down is also featured. The case on this unit looks more robust than most of the other modems, and should stand up to a life on the road (designed and made in Australia — no wonder).

Although it does have a speaker enclosed, it is pretty weak. There are no indicator lights at all on view, which means your software is the only way to see what communications are happening once you have established a communication link. Qmodem and QuickLink II are supplied — both are well supported and easy-to-use pieces of software.

Once logged on (reasonable at 13 seconds) the Banksia whaps data down the line at a hearty speed. The best we got for local calls was 1.57 minutes, and the overseas link took 2.18 minutes. Both were clean, without any fall-backs or changes. Overall, the BitBlitzer was probably the simplest to use from the box, is well proven and has good bundled software. Although a bit pricey at $1050, it can still perform with the best.

FlashTalk Line Modem

This modem is simple. You plug it in, load the software and connect. No batteries, no wires, no switches. The downside is that although you could still dial out after say, six weeks underground in Khazakstan, you have to have patience. As the works inside draw power from both the Telecom line and the RS232 as each can spare it, both sending and re-energising take time.

AMI's FlashTalk Line Modem. Best feature: good low-cost solution for users on the go

The FlashTalk is very pocketable, and comes with a 9 to 25-pin convertor. This means you have to plug directly into your portable PC, or get an extension cable. It makes sense to check the fit when you have other plugs in position on your notebook — sometimes they can obstruct each other. Otherwise, the only signs of life are two LEDs for Off Hook and Power On. The latter flicks on and off if power is sensed on the line.

No speaker is provided; this can be a nuisance if wanting to check the progress of dialling and connection. The two supplied manuals give users all they need to get up and running, along with the fairly rudimentary DOS software, MTEZ. The basic package can be upgraded to run MNP 2, 4 and 5 by software control.

Owing to the gaps in transmission while the FlashTalk was feeding itself, it had a tendency to drop out of links if the modem at the other end was not very patient (or set up to hold the line open). This could be a source of problems if a mobile user is dialling into lots of different locations. The only thing we didn't try the FlashTalk with was a mobile phone. If it works with these, remote comms is definitely on to a winner.

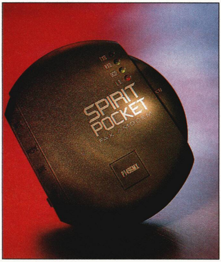
Overall? Cheap, effective and suitable to small file transfer from remote spots. Forget those 1M files though.

Spirit Pocket 1496MX

If there is one thing to say about the Spirit Pocket, it is different. You don't know whether to use it or play with it. It looks like a bonus-size Wagon Wheel without the chocolate, and with some lights.

But in spite of (or as well as) its quirky appearance, the Spirit Pocket is a very usable piece of equipment. It has a particularly long, yet flexible RS232 cable, a double-ended RJ11 with Telecom adaptor cable, a power supply, QuickLink II software, a good user manual and a flat battery (again). At least ours did. It also has a set of four indicator lights, which combined with a reasonably audible speaker to give good feedback on what is happening down the line.

Set up is a cinch. Plug in, listen to the beeps, throw the battery away and plug into the mains (battery life is listed at two hours) and link up. On the local calls, the Spirit Pocket raced into the lead with a rapid 1:54 and a good 2:40 on the US link. This was despite a retrain over around five seconds on one local call — with no dropouts at all. That's robust line handling and certainly better than most of the others units, apart from the Compaq.



Mike Boorne Electronics' Spirit Pocket 1496MX is of a truly unique design. Best feature: performs very well

The connections included are also good. Two RJ11s for line and phone, DIN to RS232 out, power in and power switch are all there. Auto power down and wake up is built into the circuitry. All the standard CCITT and MNP protocols are supported, as well as fax at 9600bps. Negotiating all these goodies took a generous 20 seconds, but the speed of transmission was worth it.

The Pocket Spirit looks great and performs as well. Recommended.

Fosh Maxlite 144PC

Fosh Maxlite PC

Although not one of the well-known names in Australia, Fosh is out to cut into the lucrative comms market with the US-sourced Maxlite range of modems. The Maxlite 144PC and Maxlite PC give 14,400 and 2400bps data and 14,400 and 9600bps fax speeds respectively. Using identical casings, the two are differentiated by colour; the faster 144PC is black, while the standard model in cream.

Both look like big mice, with a tiny speaker grille and two lights on the front. They sit pretty on the desktop too. The lights are multicoloured LEDs, which pulse and change colour to show what status is available. Round the back, both have a power switch, a DIN connector for the RS232 lead, a power in socket and an RJ11 socket. It's a bit of a squash but it works. Underneath is the space for a 9-volt battery.

Right, that's the appearance. All very nice, but what else is in the box? One copy of WinFax Lite for Windows, one copy of ComIt communications software, three manuals and a power supply.

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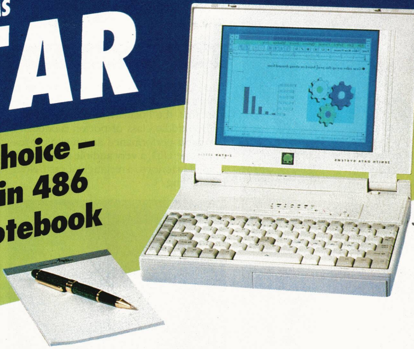

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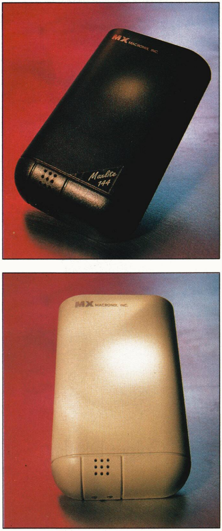


The Fosh Maxlite 144PC and Maxlite PC modems provide 14,400 and 2400bps data speeds and 14,4400 and 9600bps fax speeds

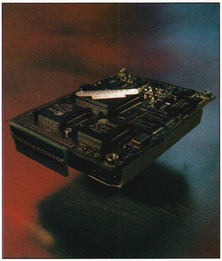
Despite the contemporary look of the two modems, the software (ComIt) is DOS-based and a none too pretty dodger. It does however, include MNP7. Two of the manuals, although with different covers, both deal almost exclusively with the said software. There is no dedicated setup section, just an add-in slip of paper and a small modem command section at the back of one manual. Disappointing.

In use, the Maxlites do the business capably, but the faster model seemed always to take its time negotiating for a connection. The slower model seemed easier to use and connect into, but that is a purely subjective opinion. As mentioned before, both were reluctant to open a dialogue with the Banksia. Dialling up and connecting was fine, but sorting speed and error control were often too much, and the units would hang.

Apart from the skimpy technical information (some of the defaults were not standard, just to make things more tricky) the Fosh offerings seem good value, especially the slower model.

NetComm Pocket Rocket

The Pocket Rocket is one of the original mobile modems. One of the smallest. Apart from that, the Pocket Rocket is very much in the middle class of pocket modems. It has good performance and technical features, one LED, a very audible speaker and a bland exterior to a rectangular case. Nothing startling.



The neat NetComm Pocket Rocket fax data modem. Best feature: versatility and capability

The unit comes with the usual NetComm bagful of goodies. A three headed fits-all cable is also included, full-on Windows Microphone and WinFax Lite software, a battery (nearly flat), and manuals galore. As well as the RS232 cable, the Pocket Rocket boasts a piggyback phone cable to let you make voice calls in addition to data swap.

Once all is plugged in via the only three ports on the unit — RS232 25-pin, RJ11 phone and power in — the modem beeps and flashes to show it is ready for action. NetComm has also thrown in a whole stack of new commands to enable the user to configure the Pocket Rocket to any particular situation.

Connection time with the Pocket Rocket was okay at 14 seconds, and the local link time (despite being flagged at 9600bps) was a decent 2:10. The US call was better than average at 2:20, but negotiation took longer at 18 seconds. One feature which was not tested, but was mentioned in the manual, was MNP10 line reconfiguration. This would be extremely handy if making regular international, large file transfers through a mixture of telecom links.

Having given the Pocket Rocket a pat on the back for capability, it must be said it costs. It is one of the most expensive of our sample (RRP-wise at any rate), which means you pay for those features. Whether or not they, plus a solid reputation for reliability, are worth it must be up to you.

What to look for

When buying a portable modem, three things are vitally important.

- **Is it fast enough?** Don't sacrifice speed today on the altar of tomorrow's phone bills.
- **Is it really compatible with the systems you need to link into?** Ask to test this if possible.
- **If you really need to move around, will it work off rechargeable batteries?** An Australian power supply is useless in Japan, and alkaline batteries can be very expensive.

Apart from these basic rules, the only extra thing to look out for is the level of feedback your software provides. Most portable modems have only rudimentary status indicators, if any at all. Trying to sort out what is happening by means of a series of cryptic screen codes is a nightmare; full English report codes are a must for mobile modems.

Compaq SpeedPAQ 144

If you want to spend a lot of money, this modem is the one to go for. For the cost of a holiday in Hawaii, you get a tiny board which slots into your Compaq portable PC and impresses nobody with any flashing

The Compaq SpeedPAQ 144 internal fax data modem. Best feature: state-of-the-art capabilities

Summary of features: Modems

	US Robotics WorldPort 14400	Banksia BitBlitzer PM1414	AMI FlashTalk Line Modem	Spirit Pocket 1469MX	NetComm Card-Modem 2400	Compaq SpeedPAQ 144	Maxlite 144PC	Maxlite PC	NetComm Pocket Rocket 144
Distributor	Dataplex	Banksia	AMI	Mike Boorne Electronics	NetComm	Compaq Australia	Fosh Australia	Fosh Australia	NetComm
Phone	(03) 210 3333	(02) 418 6033	(02) 310 1970	(02) 416 3014	(02) 888 5533	008 060 800	(03) 866 8599	(03) 866 8599	(03) 888 5533
Price	$1389	$1050	$299	$749	$799	$1493	$904	$339	$1299
Warranty	1 year	1 year	2 years	2 years	2 years	2 years	5 years	5 years	2 years
Size (mm)	85 by 55 by 5	125 by 60 by 35	100 by 60 by 28	115dia by 30	85 by 55 by 5	N/A	120 by 75 by 25	120 by 75 by 25	110 by 75 by 30
Format	PCMCIA card	Pocket	Pocket	Pocket	PCMCIA	Internal	Pocket	Pocket	Pocket
External power	○	● + battery	N/A	● + battery	●	N/A	● + battery	● + battery	● + battery
Phone cable	RJ11, DAA included & Telecom	RJ11 & Telecom	RJ11 & Telecom	RJ11 x 2 & Telecom	RJ11, DAA included & Telecom	RJ11 & Telecom	RJ11 x 2 & Telecom	RJ11 x 2 & Telecom	RJ11 & Telecom piggyback
RS/232 cable	N/A	25-pin to 9-pin RS/232	25-pin to 9-pin adapter	DIN to 9-pin RS/232	N/A	N/A	DIN to 9-pin RS/232	DIN to 9-pin RS/232	25-pin & 9-pin three way
Sockets	Custom	2 x RJ11, power	RJ11	2 x RJ11, power	Custom	RJ11, RJ25	RJ11, power	RJ11, power	RJ11, power
Manuals	1	1	1	1	1	2	1	1	2
Software	WinFax Lite	Qmodem, QuickLink II	METZ	QuickLink II	Autosoft	WinFax Lite	WinFax Lite, ComIt	WinFax Lite, ComIt	WinFax, Microphone
Display	○	○	●	●	○	○	●	●	●
Light number	N/A	N/A	2	4	N/A	N/A	2, multicolour	2, multicolour	1
Speaker	N/A	●	○	●	○	Internal	●	●	●
Max fax	14.400	14.400	N/A	9.600	N/A	14.400	14.400	9.600	14.400
Max data	14.400	14.400	2.400	14.400	2.400	14.400	14.400	2.400	14.400
Error corr.	MNP, V.42	MNP, V.42	MNP	MNP, V.42	V.42	MNP, V.42	MNP, V.42	MNP	MNP, V.42
Compression	MNP, V.42 bis	MNP, V.42 bis	MNP	MNP, V.42 bis	MNP, V.42 bis	MNP, V.42 bis	MNP, V.442 bis	MNP	MNP, V.42 bis
Performance results									
Local 256K file (sec:min)	1:58	1:57	13:00	1:54	5:45	1:58	2:16	6:36	2:10
US 128K file (sec:min)	1:32	2:18	6:32	2:40	4:30	2:10	2:38	5:28	2:20
Hayes compatible	●	●	●	●	●	●	●	●	●
Connection time	18 sec	13 sec	30 sec	20 sec	15 sec	10 sec	25 sec	12 sec	14 sec
Portability	4	3	4	3	4	4	4	4	3
Ease of use	4	4	4	4	4	4	3	3	3
Completeness	2	3	2	4	2	3	3	2	4
Support	3	3	2	3	4	3	3	3	3

dividends, as both connect time and transmission time are at the low end of the scale. Another advantage is the power source: the battery monitor in the Contura told us exactly what juice was left — no dropping out halfway through a call. All in all, the SpeedPAQ is about as good as internal modems get. But when you compare this unit with the WorldPort 14400, which does more for less and can be moved between PCMCIA PCs, you really have to think seriously about that Hawaiian holiday.

NetComm CardModem 2400

With the rapid growth in the number of portables providing PCMCIA slots, providing a modem to fit in one seemed an obvious solution to NetComm. So the CardModem 24 was born.

Identical in size to the US Robotics modem, the NetComm is half the price, but with less features. Unlike the Pocket Rocket, the CardModem comes with one tiny instruction booklet, a single disk with Autosoft DOS-based comms software and a card-to-RJ11 adaptor. The latter includes a line adaptor module that conforms to Austel specifications.

Fitting the card is simply a matter of pushing it into place, telling the PC there is a card there (sometimes a CONFIG.SYS line needs to be added) and re-booting. Running the supplied software, you can use MNP2-4 and V.42, as well as V.42bis and MNP5 compression.

These help considerably when working

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NetComm CardModem 2400

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NetComm's CardModem 2400. Best feature: value for money for PCMCIA-equipped traveller

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These help considerably when working with a slower speed that the CardModem 24 uses.

Feedback from the Intel sourced, Singaporean-built CardModem is through the internal speaker, although our setup only produced a tiny squeak. No data lights are used. Operationally, the CardModem is good for a 2400bps unit, and showed no reluctance to tell the truth about data speeds. Connection time was reasonable, and MNP5 kicked in okay with our test setup. The US link (see 'Testing' sidebar) showed less disadvantage over the higher speed units.

Apart from the fact that the software supplied is not in the same league as the other NetComm offerings, the CardModem can still provide good value for money to the PCMCIA-equipped traveller. And it costs zilch to run.

US Robotics WorldPort 14400

It's a tiny terror, a minuscule marvel and a powerhouse pocket performer. Enough said; the WorldPort 14400 is good.

Certainly it costs you a whopping $1389, but it does everything you could want from a state-of-the-art communications device, and you simply plug it into any vacant PCMCIA slot. Data speeds to 14,400bps, while fax at the same speed and low power consumption make this little beauty the tester's favourite.

Although it only comes with WinFax Lite and no comms software at all, it still shines. Supplied in a small plastic case, it is only accompanied by its RJ11 DAA and one manual. After setting up the card, the average connection time was around 18 seconds, which is slightly slower than some others. However, both local (1:58) and especially international (1:32) tests calls were as good as the best.

It must be noted the US call was made at a different time to the rest of the review group, so that could explain some of the speed advantage. The speaker feedback was slightly more audible than the NetComm CardModem, but made some horrid noises to go with it. Unlike the NetComm card, this one is made in France by a PCMCIA manufacturer recently taken over by US Robotics. It seems they wanted to get the jump on the rest of the card modem makers; they have succeeded.

The WorldPort 14400 fax data modem. Best feature: top-line PCMCIA capabilities

As well as the usual high-speed compression and error checking, the makers have designed in auto-retraining as used in top-quality professional modems. This allows the line quality to be monitored, and if a drop-out occurs, the modem will hang on until the line clears again. That is a superb extra when you are halfway through sending a 500K file to Singapore and the satellite goes off-line.

In short, the WorldPort 14400 costs and arm and a leg and is worth it.

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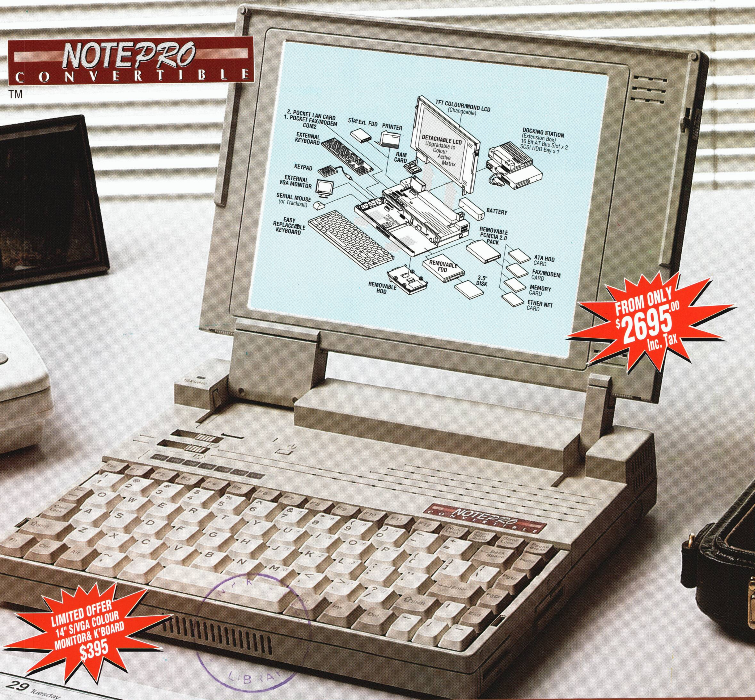
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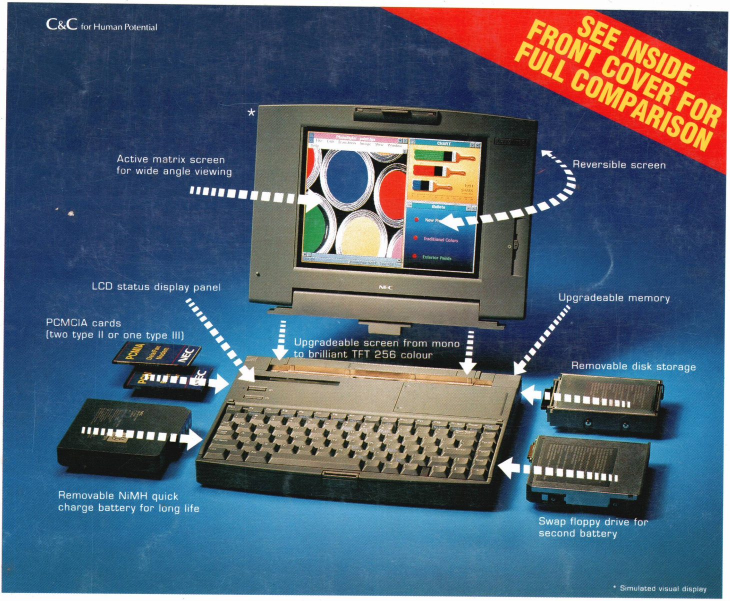
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